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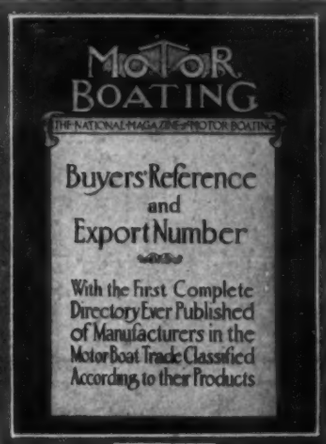
MOTOR BOATING
THE NATIONAL MAGAZINE OF MOTOR BOATING
Buyers' Reference
and
Export Number
With the First Complete Directory Ever Published of Manufacturers in the Motor Boat Trade Classified According to their Products

1910

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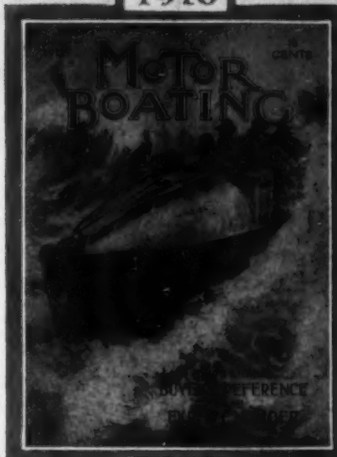

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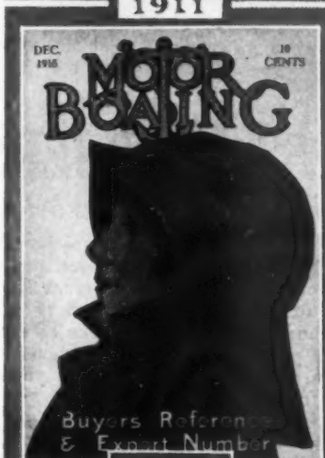

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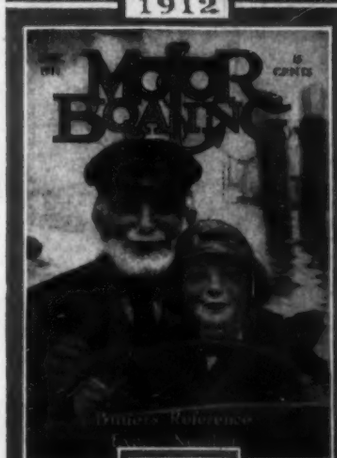

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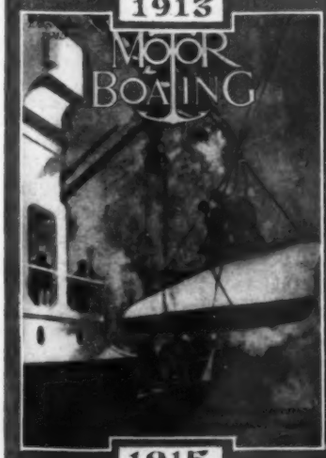

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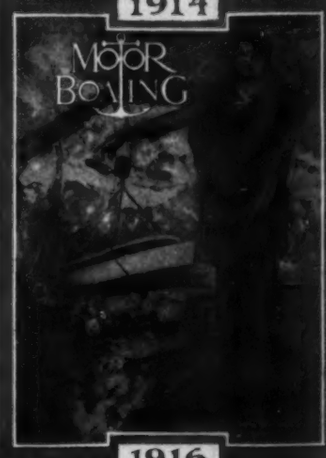

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Contents December 1917

Tenth Anniversary and BUYERS REFERENCE & EXPORT NUMBER

Buyers' Reference and Export Number Covers for 10 years 5
Our Tenth Anniversary 7
Ten Years of MoToR BoatinG 8–9
Pioneers of the Motor Boat and Engine Industry 10–12
From Hydroplane to Air Cruiser 13–15
Typical Motor Cruisers of 1907 and 1917 .. 16–17
Which Way Does the Pendulum Swing? ... 18–19
Practical Navigation for the Motor Boatman . 20–23
How Racing Speeds Have Jumped in a Decade 24–25
American Marine Motors and Their Manufacturers 26
The Two-Cycle Motors of 1918 27–28
Diesel and Heavy-Duty Oil Motors 28
The Answer of the Slide Rule 29
The Four-Cycle Motors of 1918 30–32
Wireless Telegraphy and the Motor Boat 33–35
My Ideal Cruiser 36–37
The Diesel Engine and Motor Ship 38–40
Why Some Motors Are Uneconomical 41–42
A Sixty-Foot Patrol Cruiser 42
Ten Years of the Marine Motor Industry .. 43–44
The Prize Contest in Questions and Answers
How to Save Fuel 45–46
An Ice-Box for a Cruiser 47–48
Standardization the Watch-Dog of the Future . 49–51
Marine Engine Lubrication 52
Seventy Miles An Hour in a Motor Boat 53
Builders of Standardized Design Boats 54
Stock Boats for Outboard Motors 54
The Boats of Standard Design for 1918 55
The War Tax on Motor Boats 56
Yard and Shop 57–59

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Silent -:- Powerful -:- Luxurious

CRAFT for those who want and appreciate the best. Built with a practically indestructible hull. Powered with motors of great speed and strength. Furnished with the luxurious completeness of a modern home. The peer of these boats cannot be purchased. They represent the utmost in forty and fifty foot cruising yachts. They are ideal for southern water use.

Our Bulletin No. 555-A describes and illustrates in complete detail the 50-ft. model. This craft has a speed range of from 20 to 24 miles per hour. Accommodates party of eight and crew of two. Comes equipt in every particular for operation.

Our Bulletin No. 222-A covers our 40-ft. cruiser which accommodates a party of six and has a speed range of from 20 to 22 miles per hour.

Through our policy of standardization and large production we are enabled to make immediate deliveries on a number of either of these models. We urge a prompt response if such is your desire. Address,

Great Lakes Boat Building Corporation
MILWAUKEE WISCONSIN

Designers and Builders of Boats of Distinction and Quality

RECENT PURCHASERS OF GREAT LAKES CRAFT

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MR. HARRY STUTZ, - - - - - - - - Indianapolis, Ind.
MR. H. S. FOX, Jr., - - - - - - - - Houston, Texas.

Our Tenth Anniversary

TO-DAY we celebrate our tenth birthday. True it is that we are young compared with the industry we represent, but we believe that our ten years of existence has done much to broaden and elevate the business, and to increase interest in and respect for the motor boat and the internal combustion engine as an adjunct to a great national sport and means of healthful recreation.

From the smallest publication, with only a few pages each month, MoToR BoatinG has grown to be the largest and most representative. From the position of the least circulation to the greatest is our record for ten years. From the magazine carrying the least amount of advertising to the one with the most each month is history to be proud of. From small beginnings editorially to a leader in its field, a magazine on which no pains have been spared to make each succeeding number more attractive, more interesting, and more instructive, as well as a credit to the high standard which the marine industry is reaching, is the mark we have steered for.

Our policy has been one of fair and equal treatment to all, favoring or slighting no branch of the field. We have endeavored to touch on all phases of the sport and industry in each issue, balancing the contents of MoToR BoatinG so that the professional as well as the veriest amateur; the man interested in the smallest open boat equipped with a single lunger and the yachtsman who enjoys life to the highest extent from the quarterdeck of his motor yacht; those who cruise as well as those who are partial to the racing game; the man who builds his own little ship and he that is interested in studying the best which is being produced each month by the foremost architects and builders; the club members and the rocking-chair fleet; so that all could enjoy each issue as it appeared and find recreation and instruction in MoToR BoatinG as a whole as well as in that particular branch of his hobby that interests him the most.

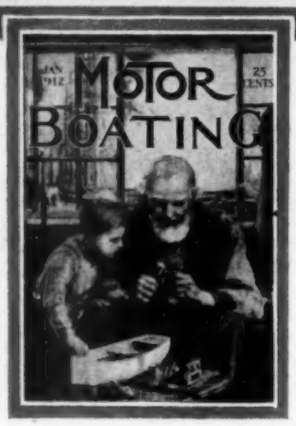
How well we have succeeded is attested to by the many words of approval received from the motor boatmen of the country, and from our many friends in the trade. To all we extend our thanks for their support and co-operation since 1907.

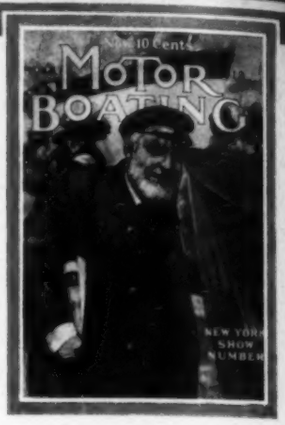
To those of our advertisers who were with us ten years ago and still remain with us, we believe such a record stands as a monument to their successful business methods and a guarantee to the quality of the products.

The history of such concerns as the Elco Co., of Bayonne, N. J.; the Standard Motor Construction Co., of Jersey City, N. J.; the Gas Engine & Power Co. and Chas. L. Seabury & Co. Cons., of Morris Heights, N. Y.; the Gray Motor Co., of Detroit, Mich.; the Frisbie Motor Co., of Middletown, Conn.; F. S. Nock, of East Greenwich, R. I.; J. H. Curtiss, of New

(Continued on page 80)

The advertisement of the Elco Co., which appeared in the first issue of MoToR BoatinG





Ten Years o

The Wonderful Advancement Which a D tional, Industrial, and Sporting Importan Combustio

By T.

WITH this issue of MoToR BoatinG comes the Tenth Anniversary of our existence in the world of magazines and motor boats. We venture to say that probably no other industry has shown a more steady growth and development during the last ten years than that of the motor and boat builder.

In looking back over the development of the motor boat throughout this country during the last ten years we cannot help noticing the different types that have developed in the various parts of the country. In the East we have the comfortable, seaworthy cruiser, the express cruiser, the military or scout-type cruiser, the cruising houseboat, the runabout capable of being out in rough weather, the auxiliary sailing vessel and the speed boat. In the Mississippi Valley, the Great Lakes and adjoining waters we have the fast runabout and the speed boat. On the Pacific Coast the greatest development has probably been in the commercial motor boat, which is now almost universally used for the purse seiners and cannery tenders in the salmon fisheries, the auxiliary ketches and schooners used in the herring and halibut fisheries and the auxiliary trading schooners making their long trips up the Alaskan Coast and even to Siberia. They have also developed some fast boats on the coast, and last, but not least, the cruiser with the pilot house and other comforts necessary for the enjoyment of trips in a climate such as is found at Puget Sound and other Pacific ports.

The last decade has seen the cruising motor boat develop from the top-heavy glass-cabin boat to the trunk cabin and then to the comfortable, seaworthy raised-deck cruisers of today with electric lights, a well-arranged galley, neat and roomy staterooms and every comfort that can be found on shore. The express cruiser and scout or military-type cruiser are entirely new types developed during the last few years.

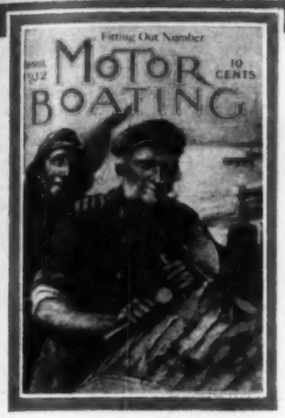
The open motor boat or family launch, as it was called, has almost disappeared and in its place is found the runabout with its enclosed engine space, its increased speed and comfort, and embodying many new features, every one of which adds its bit to the pleasure of the short trip or picnic. For those who wish a larger boat with permanent protection against bad weather we now have the day cruiser, a boat of fairly good speed and limited cabin accommodations. This latter type is also quite popular as a means of making the daily trip between the suburban home and the owner's place of business.

Probably the greatest change in motor boats during the last ten years is to be found in the speed boat. The early type of this boat was a long, narrow craft of the displacement or double-wedge type, rather deep forward and flat at the stern, driven by an engine that now would be considered only of moderate power, and altogether, a boat that was rather difficult to handle and capable of a maximum speed of about 30 m.p.h. The modern speed boat, or hydroplane, is a development of the V-bottom type combined with the early type of glider developed in various forms

FRISBIE MOTOR
MARINE
4-40 H.P. $175-$900
FOUR CYCLE
because they are BEST, last the longest and are the most economical to run.
Our Engine is installed in Speedy "Hornet," 23 miles per hour, and many other speedy launches on the Connecticut River. We build Marine, Auto and Stationary Engines.
ONE PINT PER H.P. PER HOUR.
The Frisbie Motor Co.
MIDDLETOWN, CONN., U. S. A.

All Types of
Sail and Power Boats
CRUISING LAUNCHES A SPECIALTY
FREDERIC S. NOCK
Naval Architect and Builder
EAST GREENWICH RHODE ISLAND
MARINE RAILWAYS STORAGE REPAIR WORK BASIN

Reproductions of the original advertisements of the Frisbie Motor Co., of Middletown, Conn., and Frederic S. Nock, of East Greenwich, R. I.



MoToR BoatinG

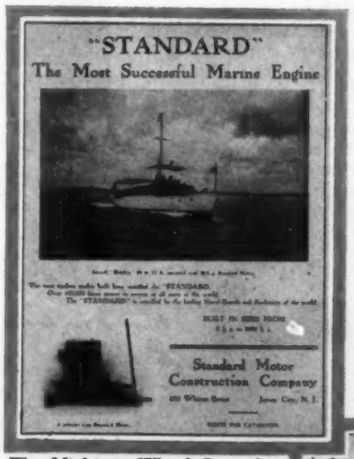
ade Has Brought Forth in the Construc- of American Motor Boats and Internal Engines

By T. Rockwell

in France, and the multi-step glider as developed in this country and in England. The present-day speed boat has passed the mile-a-minute mark, developing a maximum speed of 61.7 statute m.p.h. as an average of six runs over a one-mile straight-away course.

As we look over the more important events in the motor boating world from 1907 down to the present day, the first achievement we find is the race from New York to St. David's Head, Bermuda, for the James Gordon Bennett cup and $1,000.00 cash, won by the well-known 60-footer Ailsa Craig, which made the trip in 66 hours, 30 minutes, 40 seconds. Then we have the International Races held on Huntington Bay for the Harmsworth Trophy, which was brought to this country in 1907 by Dixie and successfully defended in 1908 by Dixie II, which made a record speed of 31.9 statute m.p.h., and was driven by a 200 h.p. engine. This same boat won the trophy offered by the National Association of Engine and Boat Manufacturers in the annual National Motor Boat Carnival and developed a speed of 33.1 m.p.h.

In 1909 the ocean race to Bermuda was won by Heather, and the New York-Marblehead Ocean Race was won by Elmo II. On June 22, August Belmont turned the first shovel of dirt for the Cape Cod Canal, the long-planned and long-discussed waterway to join Buzzards Bay and Barnstable Bay only eight miles distant. The Gold Cup Race, held at the Thousand Islands, was won by Dixie II, establishing a record of 32.87 m.p.h. for this event. The annual National Motor Boat Carnival speed contest was won again this year by Dixie II.



The Michigan Wheel Co., of Grand Rapids, the Standard Motor Construction Co., of Jersey City, and J. H. Curtiss, New York City, all advertised in the December, 1907, issue of MoToR BoatinG

SPEEDWAY LAUNCHES
Some Notable Examples
The Speedway Engine is Right
MANUFACTURED BY
Gas Engine & Power Co. and Chas. L. Seabury & Co.
CONSOLIDATED
Morris Heights New York City

The Gas Engine and Power Co. and Chas. L. Seabury & Co., Cons., were going strong ten years ago, and their pace hasn't slackened since

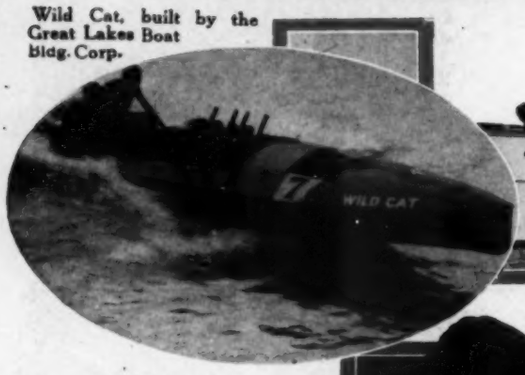
In reply to the question put forward in 1909 by MoToR BoatinG "How Big Can a Motor Boat Be?" Messrs. Cox and Stevens gave as their answer that the ultimate size would probably be a 125-foot, triple-screw boat, the limiting factor being an engine of 300 h.p.; and that the present practical limit was a boat 98 feet long, 16 feet beam and 5-foot draft, this being the maximum size that could negotiate the Erie and Champlain Canals. Clinton H. Crane gave as his opinion that a vessel of 1,000 tons, about 240 feet long and powered with three 500 h.p. engines was the ultimate size, but that at present a motor boat over 100 feet long was not desirable, the fuel question being the limiting factor. Morris M. Whitaker stated that it was his belief that the largest motor boat practical would be a vessel 250 feet long and powered with three 500 h.p. engines, which would give it a speed of from 10 to 12 m.p.h. R. M. Haddock thought that the fuel expense would keep the length of gasoline-driven motor boats within the 100-foot limit but should a satisfactory producer gas plant be developed, the limit would be increased to 200 feet or even 300 feet. Compare these answers with the development of the motor boat up to date.

Early in 1910 the French developed a hydroplane only 10 feet long and powered with a 70 h.p. aeroplane motor which

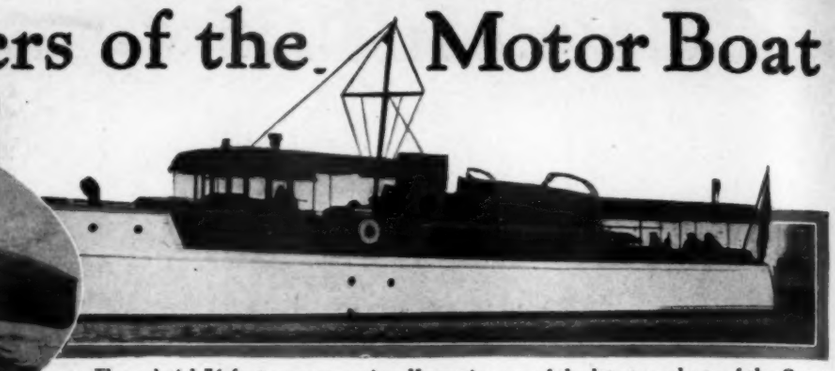
(*Continued on page* 52)

CURTISS COMPANY
20 FULTON ST., NEW YORK
RACEABOUT Fig. 20 and 20 $15.00 AND $10.00
NAIAD Fig. 28 SIREN Fig. 29
MARINE WATER CLOSETS, LAVATORIES, PUMPS, ETC.

Pioneers of the Motor Boat



Wild Cat, built by the Great Lakes Boat Bldg. Corp.

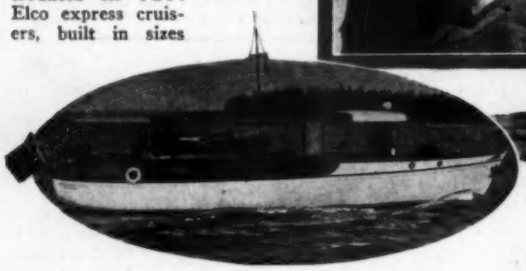


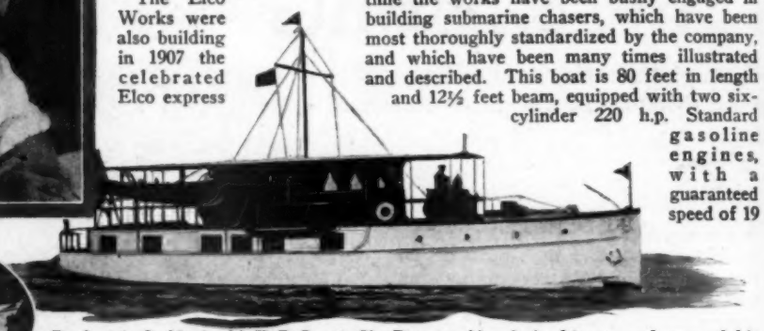
The palatial 76-foot express cruiser Kumagin, one of the latest products of the Great Lakes Boat Bldg. Corp.

The Elco Co.

THE Elco works have been located at Bayonne, N. J., since 1900, the company having been incorporated in 1892. Previous to moving to Bayonne, the works had been located in South Brooklyn and on the Harlem River, New York.

In 1907 the company first introduced its fast Elco express cruisers, built in sizes varying from 40 to 50 feet in length.





Frederick S. Nock, MoToR BoatinG's Pioneer Naval Architect, and two of his boats, one of 1908 vintage and the other of 1916

The illustration on page 12 is of the 40-foot Elco cruiser Carlotta, designed and built by the company for use on Lake Como, Italy, where the boat was delivered and has since won many prizes in contests for speed, cabin appointment and general serviceability.

Carlotta was 40 feet in length and 8 feet beam and equipped with a six-cylinder 60 h.p. air-starting Standard gasoline motor, the first of the large Standard automarine engines, which gave the boat a speed of 18 miles an hour. Carlotta was exhibited at the Motor Boat Show in Madison Square Garden in 1907, when it was sold to Mrs. F. A. Andrew for $10,000. At the time it represented the largest individual sale recorded at a Motor Boat Show. Carlotta was one of the first of the express cruisers and the general arrangement of placing the motor forward with cabin quarters amidships, as carried out in this boat, has been followed in present-day designs.

The Elco Works were also building in 1907 the celebrated Elco express launches, cabin cruisers of moderate speed equipped with heavy-duty motors, and Elco motor yachts up to 120 feet in length.

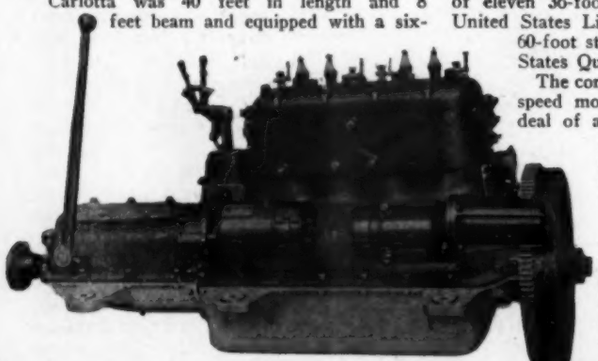
The models referred to above were thoroughly standardized and duplicated in quantity.

In addition, a large amount of government work was put out during the year consisting of eleven 36-foot power life boats for the United States Life Saving Service and four 60-foot steam launches for the United States Quartermaster's Department.

The company led in the field of high-speed motor boats and gave a great deal of attention to standardizing its product so that the boats could be duplicated in quantity in the most efficient manner.

The experience gained in this direction proved a great help in designing and developing the manufacture of the Elco submarine chaser. This type of craft was first suggested by Henry R. Sutphen, vice-president of the company, to the representative of the British Admiralty in the Spring of 1915, and since that time the works have been busily engaged in building submarine chasers, which have been most thoroughly standardized by the company, and which have been many times illustrated and described. This boat is 80 feet in length and 12½ feet beam, equipped with two six-cylinder 220 h.p. Standard gasoline engines, with a guaranteed speed of 19 knots with full equipment and armament.

Five hundred and fifty of these boats were constructed by the Elco Company in the record time of 488 working days. The first order was received in the Spring of 1915 and the final boats completed in October, 1916, ahead of contract time. These boats were shipped by steamer to Europe from Canadian ports



A present day Gray unit power plant, complete in every particular, with self-starter and lighting outfit attached

H. G. Diefendorf, vice-president and manager of the Gray Motor Co., who is also celebrating a tenth anniversary. He has been with the Gray Motor Co. for ten years.

A Gray of ten years ago

O. J. Mulford, president of the Gray Motor Co., of Detroit, Mich., a pioneer as well as a motor boatman himself. Being an enthusiastic boat owner, Mr. Mulford knows what a marine motor should be and has embodied his ideas in the Gray design

and Engine Industry

A Brief Auto-biography of Those Concerns Which Were Represented in the First Issue of MoToR BoatinG

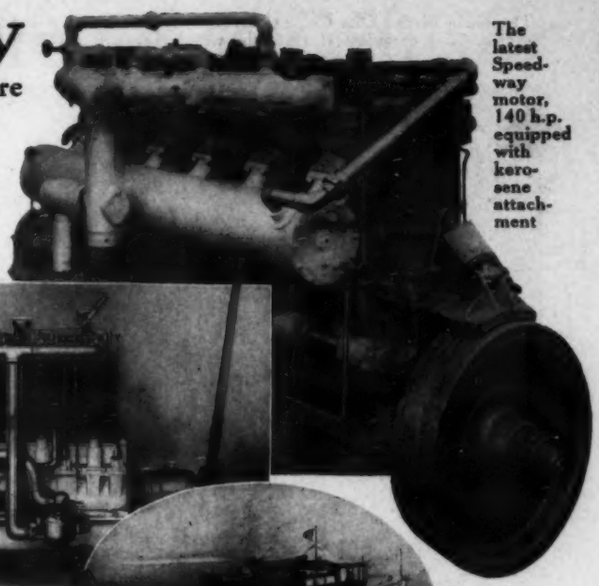
and have been in active service since their delivery.

In August, 1917, the British Admiralty placed another order with the Elco Works for 80-foot Elco submarine chasers, the duplicate of what had previously been furnished by the company. Deliveries of these boats are now being made and the order will be completed before the end of the present year.

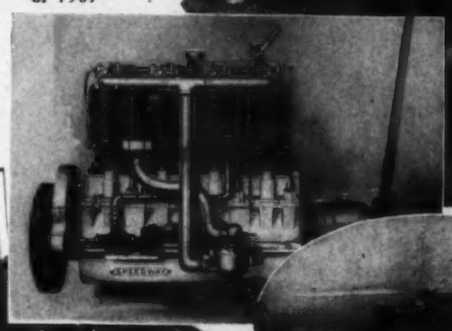
In addition to the chasers furnished the British Admiralty, Elco submarine chasers have been supplied to France, and the company is now building at its works at Bayonne, ninety Elco submarine chasers for the Italian government, of which a large number have already been delivered.

The record made by the Elco works in the building of submarine chasers for the British Admiralty has not been equalled by any other boat builder. It represented the largest boat building enterprise that ever was undertaken and the completion of the work ahead of contract time shows the enormous value of standardization and the company's efficient organization. In addition to the submarine chasers being built for the Allied Governments, the Elco works are now completing sixteen 110-foot chasers for the United States Navy which were ordered in the early part of this year and which will be completed on contract time, by the end of December.

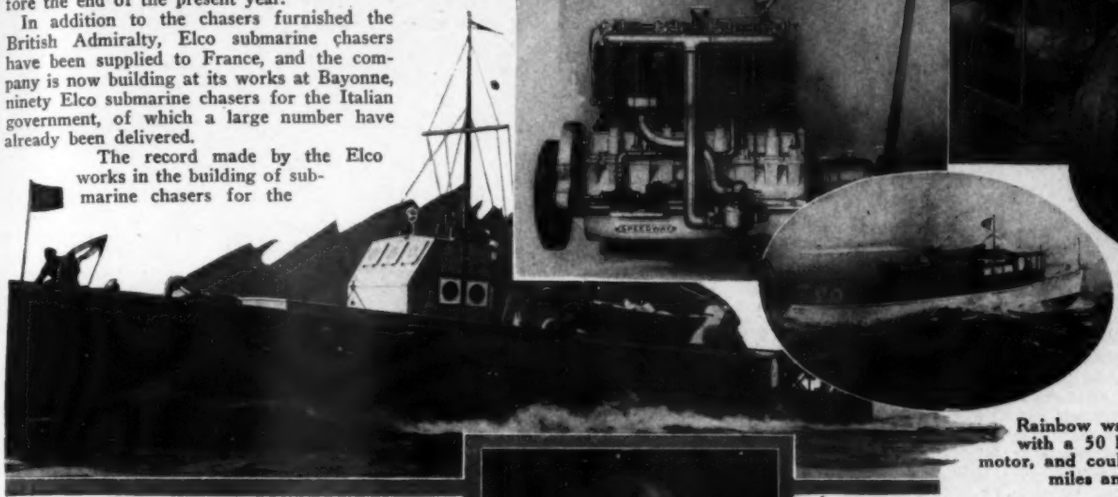
Ten years ago the Elco works were delivering on an average of from 25 to 35 boats a year. During the last two years it has averaged over 200 boats a year, showing the enormous increase in the company's production.



The latest Speedway motor, 140 h.p. equipped with kerosene attachment



A Speedway motor of 1907



Rainbow, built by the Gas Engine & Power Co. in 1907 for Richard P. Joy, of Detroit, Mich. Rainbow was a 53-footer with a 50 h.p. Speedway motor, and could make 11½ miles an hour

Acoma, the latest production of the Gas Engine & Power Co. She is powered with two eight-cylinder Model M 5¾ x 7-inch Speedways

J. J. Amory, president of the Gas Engine & Power Co., and Chas. L. Seabury & Co., Cons., of Morris Heights. For many years Mr. Amory has been one of the industry's boosters

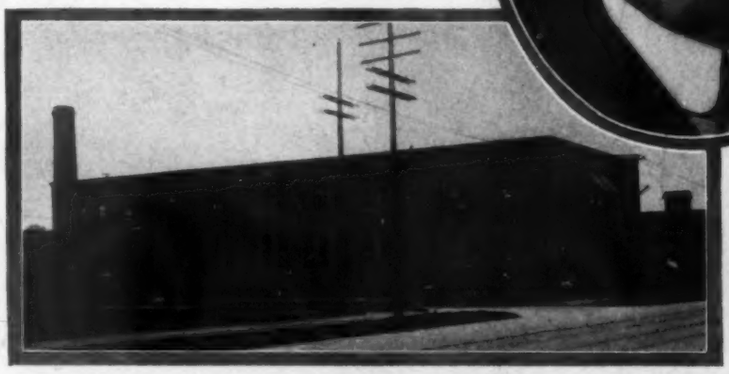
Gas Engine and Power Co. and Charles L. Seabury & Co., Cons.

SINCE 1885—some years before the advent of the gasoline internal-combustion motor—the Gas Engine & Power Co. and Charles L. Seabury & Co., Cons., has been engaged in the designing and building of marine machinery, launches and yachts, in addition to their kindred accessories. Their products have a distribution which covers all parts of the world where power craft are used and the success resultant from their proven excellence has conferred upon the name of the company the reputation for being the standard of perfection in the art.

Comprising an area of ten acres upon half of which is erected complete manufacturing shops, building sheds, offices and the like, the plant commands a splendid water front of approximately 1,800 feet on the Harlem River.

The recent development has not been in the direction of additional ground space but rather in the rearrangement and improvement of the present facilities, with new, practical manufacturing devices and, at this date, the Speedway shops are probably the most modernly equipped plant of its kind in the country. It always has been the policy of the shops to produce craft in their entirety—designing, building and furnishing, including all equipment which may be expediently made there. This concentrates the responsibility for the performance of the finished product upon the builders. Contracts are, however undertaken on plans and specifications prepared by other naval architects, and if past performance is a criterion, satisfactory results are insured.

Harry J. Perkins, president and treasurer of the Michigan Wheel Co., of Grand Rapids, Mich.



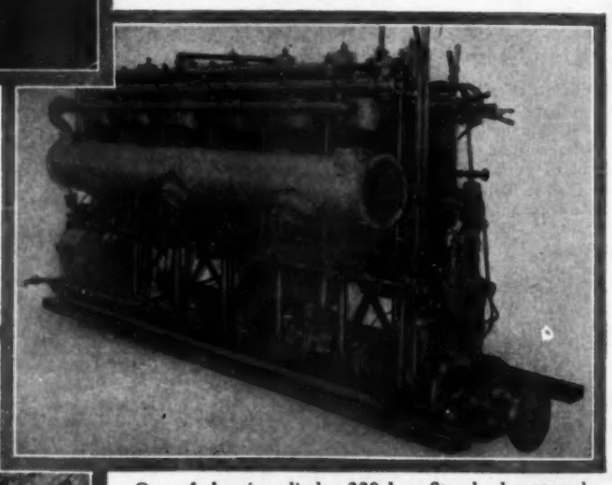
The present plant of the Michigan Wheel Co., at Grand Rapids, Mich.

The basin of the Elco Co., at Bayonne, N. J., showing some of the submarine chasers recently completed for this and foreign governments. The complete story of the wonderful feat of building 550 of these boats in 488 working days appeared in the June issue of MoToR BoatinG

A 40-foot Elco cruiser built in 1907 for use on Lake Como

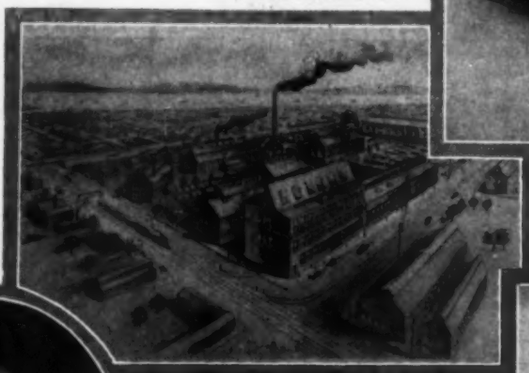
Henry R. Sutphin, vice-president of the Elco Co., the man chiefly responsible for the success of the company's progress and many achievements for the last ten years

Eugene A. Riotte, president of the Standard Motor Cons. Co., of Jersey City, N. J., the man who completed the 1,100 motors for the British Government



One of the six-cylinder 220 h.p. Standard motors being used in the new 110-foot submarine chasers

Present plant of the Standard Motor Construction Co.



Russell A. Frisbie, president and founder of the engine company which bears his name

Three excellent yachts, very different in type, completed during the past few years, are the 106-foot auxiliary schooner Haida, the Vagabondia, a houseboat 129 feet in length, and the Speedway motor-powered Blue Bird, a steel cruiser measuring 126 feet over all. The first two were constructed to plans furnished by Cox & Stevens, New York, and Gielow & Orr are the designers of Blue Bird.

Speedway gasoline engines, especially those of the greater powers, as the six-cylinder, slow turning, air starting and reversing, 250 h.p. type, having during recent years shown increasing popularity with other designers and builders of high-class yachts. Probably the best known are the Lawley-built yachts, as the 140-foot Sabalo, the Monaloa measuring 135 feet, the new Watts-designed, 110-foot Consuelo and the 126-foot steel Tarantula, whose log showed 65,000 miles up to the start of this season.

An interesting comparison of the motor boats of eight or ten years ago and those of to-day can be made with Speejacks and Whirlwind as examples of the earlier period. The 77-foot Speejacks still modern in appearance and construction can rightfully be called the forerunner of the present-day scout cruiser by virtue of a speed of 29.75 miles. Whirlwind, a triple-screw and 111 feet long, capable of a 26-mile speed, is now in Patrol Service, still with the identical engines that were new in 1909. Both boats were created and constructed, complete, in the Speedway shops.

The Model M Speedway, the largest new engine, was first offered three years ago. It is conceded to be one of the best of its kind ever built. This series is of the moderately high-speed type, developing its maximum horsepower at 1,200 revolutions and includes units of four, six and eight cylinders, having a bore and stroke of 5¾ by 7 inches. It may be recalled that this model holds the world's speed record for cruisers.

It is unnecessary to explain to the average owner, well versed in affairs yachting and familiar with the firm's position since the consolidation of Charles L. Seabury & Company with the Gas Engine & Power Company, yet it may be well to state that the line of development during the past ten years has been especially in the matter of standardization of yacht building. This year the models of standard design include six yacht tenders and seven runabouts of various lengths and speeds. The smallest cruiser is a 40-foot, 20-mile boat and the next is 52 feet long, speed 17.75 miles, with the largest a pretentious

(*Continued on page 78*)

From Hydroplane to Air Cruiser

The Result of Ten Years of Progress and Development in One Field—Principles Proven and Demonstrated by the Racing Motor Boat Taken Advantage of and Applied

By Henry Woodhouse

THE air cruisers being planned to-day for the trans-Atlantic flight, which number about half a dozen different types, ranging from 800 to 2,000 h.p. each, represent the realization of the dream of the motor boatman of ten years ago.

It was to get this additional speed that Comte de Lambert concentrated his efforts in developing a hydroplane.

Experiments with hydroplanes were made as early as forty years ago. In 1872 an engineer named Froude, under the auspices of the British Admiralty, experimented with planes sheathed with polished metal, grouped and inclined. This experiment was, however, without result. The writer is indebted to Orville Wright for pointing out that Comte de Lambert, the well-known aviator engineer, was the inventor of the hydroplane. In Mr. Wright's own words: "Although suggestions of the hydroplane idea had been made years ago, and although Froude had made some experiments without results as far back as 1872, Comte de Lambert was the real inventor of the hydroplane. He was the first to produce a successful one, and all modern hydroplanes are based upon his work. In 1897 Comte de Lambert experimented with a catamaran formed of two narrow floats, to which were attached four transverse planes, whose inclinations could be varied two or three degrees. At a speed of ten miles an hour, the floats were lifted entirely out of the water, and the machine glided over the surface of the water on the four hydroplanes. Comte de Lambert continued these experiments during the following years up to 1907, and he succeeded in increasing the speed to thirty-four miles an hour."

In broad outlines a hydroplane is a craft having a water borne base in the form of a pontoon, or boat, and the organs of an aeroplane, whereby it operates from the water as a base as distinguished from the land, and is adapted to travel at speed upon the surface of the water, or fly in the air. The boat or pontoon is for these purposes fitted with a hydroplaning bottom so arranged that when under power on the water the craft is lifted to the surface by the combined aeroplane and hydroplane action and skims thereover. It may then either be operated at speed without leaving the water, or, having attained sufficiently high speed to enable the wings to support the entire body, rise from the surface and fly in the air. These two capabilities, cruising at speed and flying, render the hydroplane not only of inestimable value for naval warfare, but extremely attractive for sporting and commercial purposes.

It is, therefore, the hydro that makes the hydroaeroplane—which explains why the present chapter opens with the first attempt to fit an aeroplane with pontoons to keep it afloat. The difference in principle between a hydroplane and a pontoon is about the same as that between an aeroplane and an airship. The first cuts through the water in about the same way as an aeroplane cuts through the air, with practically no displacement; while the second displaces the fluid according to its bulk. The first may attain high speed with moderate power, while the latter requires, comparatively, high power for moderate speed. The float used at present is a combination of pontoon and hydroplane; that is, the pontoon is flat-bottomed, usually with an upward slope in front, a combination that works like the hydroplane, causes it to rise to the surface when traveling, so that it can acquire the necessary speed for launching in flight.

The flying boat, which was developed a year after the hydroaeroplane had proven a success, is essentially a motor boat with wings.

1918—An air cruiser with enclosed cockpit and engine-room

1917 — The monstrous Italian plane which has been breaking many American records recently. It has a speed in excess of 110 miles per hour

The first to fit pontoons to an aeroplane was William Kress, the Austrian engineer and father of Austro-German aviation. His test was made in 1898-1902 as the result of forty years of experimenting with heavier-than-air structures, during which Kress had constructed a number of machines, including a helicopter and an ornithopter. The Kress was a triple monoplane, fitted with two parallel elongated

floats, a 30 h.p. motor and two propellers. The two floats were of aluminum and had runners, so that the apparatus could be operated on the snow as well as on the water. The tests took place at the Unter-Tullnerbach docks, Austria, and gave remarkable results, considering that the inventor had to create all except the motor, and was handicapped by the latter on account of its great weight. The machine traveled over the water under limited control at a speed of a fast rowboat. This apparatus came to grief at the close of 1901, adverse wind and a leak in one of the floats sending it to the bottom of the dock. Another experiment in 1902 was not concluded through lack of funds.

In 1905-06, three of the French pioneers of modern aviation—Ernest Archdeacon, Gabriel Voisin, and Louis Bleriot—who experimented with the Chanute-Wright gliders, thought, after wrecking several machines by falls on land, that the water surface, being elastic, would be less dangerous to the operator, so they fitted their gliders with pontoons. The Archdeacon glider, fitted with two boat-like floats, was first tried on the River Seine, near Paris, on June 8, 1905. It was towed by a fast motor boat and was piloted by Voisin. It rose to a height of about fifty feet over a distance of 400 feet. The Bleriot glider, also towed by a motor boat and piloted by Voisin, proved to have less stability, and on July 18, 1905, being struck by a sudden gust of wind it dove into the water and Voisin, caught in the cage-like affair, was submerged for twenty seconds. The Archdeacon experiment ended at the close of 1905 when Voisin left Mr. Archdeacon and formed partnership with Bleriot. The outcome of the Bleriot-Voisin partnership was two hydroaeroplanes, one consisting of two elliptical-shaped cells, fitted with three pairs of cylindrical, sheet-metal floats, a 24 h.p. motor, and two propellers; the other was a combination of the first and the Archdeacon glider and was fitted with improved pontoons and two 24 h.p. Antoinette motors. Nearly a year was spent in experiments, but with little results. The principal trouble was no doubt the insufficient motor power, and the fact that the pontoons were not scientificaly constructed.

Early in 1905, Professor Enrico Forlanini of Milan, Italy, applied for a patent for a hydroaeroplane of his own invention. That he had a very lucid conception of the advantages of the hydroaeroplane is shown in the patent specifications, part of which reads as follows:

"My invention has reference to ships or vessels of that kind which, instead of plowing their way through the water, skim over the surface, thereby offering much less resistance and as a consequence are capable of attaining very much higher speeds.

ner as to glide over the surface of the water, rather than that of obtaining a true hydraulic flight. To this end it has been usual to make use of hydroplanes arranged, for example, in such a manner as wholly or partially to lift the vessel out of contact with the surface of the water when said vessel is propelled.

"The object of my invention is so to improve such devices that their efficiency is greatly increased, and one of the essential features of my invention is that a boat constructed in accordance therewith will be capable not only of skimming over the surface of the water, but may be also used as a flying machine of the aeroplane type, and I have succeeded in constructing an apparatus which has in practice given most satisfactory results." But the inventor did not carry his experiments in that line to a finish, turning instead to the hydroplane, on which he is an authority.

Further experiments with hydroplanes were conducted in different countries, notably in Italy by Crocco and Riccaldoni, in France by Clement Ader, Ricochet, and Bonnemaison; in Switzerland by the Defaux brothers; and to a less extent by others in different countries. But while these experiments contributed each something to the final development of hydros for aeroplanes, the object of the experimenters was not to develop a marine aeroplane.

In 1905, at Saint Helens, Isle of Wight, England, Dr. F. A. Barton and F. L. Rowson made experiments with a birdlike apparatus fitted with floats. The machine had two wings or main planes set dihedrally, elevating plane in front and an empennage consisting of two planes, both movable with a rudder. It was 36 feet long and 34 feet across the main planes.

The pontoons were 20 feet long, 10 inches wide, 4 inches deep, were made of a light skeleton framework of whitewood, the sides and bottom of which were covered with three layers of mahogany veneer glued together. The whole pontoon was covered with canvas and varnished. Several towed flights were made at sea in September, 1905. During the most successful, the machine rose four feet, then the rope broke, and in the fall the glider was damaged. Failing to secure a suitable motor for the machine the experiments were abandoned.

In 1906-07 experiments with a large glider fitted with pontoons were made by Israel Ludlow, in America. Several experiments were made with this machine towed by the naval tug Potomac and the torpedo boat Gwinn at Hampton Roads, during the Jamestown Exposition. But the experiments were discontinued following an accident which wrecked the glider.

The Wright Experiment

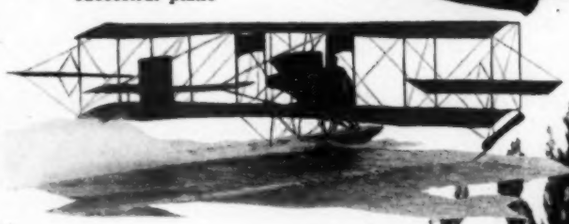
In 1907 the Wrights experimented with hydros intending to develop them for use on their flyer, and thus have a machine which would have permitted them always to find good landing places in large streams.

The following quotation from the Dayton *Daily News* for March 21, 1907, shows that the Wright brothers had at the time a thorough idea of the advantages offered by the water as a field for experiments:

"The balustrades of the Third Street Bridge were lined Thursday morning with curious

1912 — Curtiss flying boat

1912—Burgess flying boat



1911—Glenn H. Curtiss' first successful plane

The first hydroaeroplane to rise from the water, a Faber, year 1910

"Heretofore many attempts to produce an efficient apparatus of the hydroplane type have been made, the majority of them based upon the phenomenon exhibited when a flat object, such as a stone, for example, is thrown in such a man-

The hydroaeroplane of 1907, a Bleriot, which never progressed beyond the experimental stage

spectators, who were watching the antics of a modern water bird. The banks of the stream around the central point of action were also spotted with onlookers. The object of interest was the hydroplane, which Orville and Wilbur Wright, inventors of the airship, were tampering with in preparation for its initial experiment run.

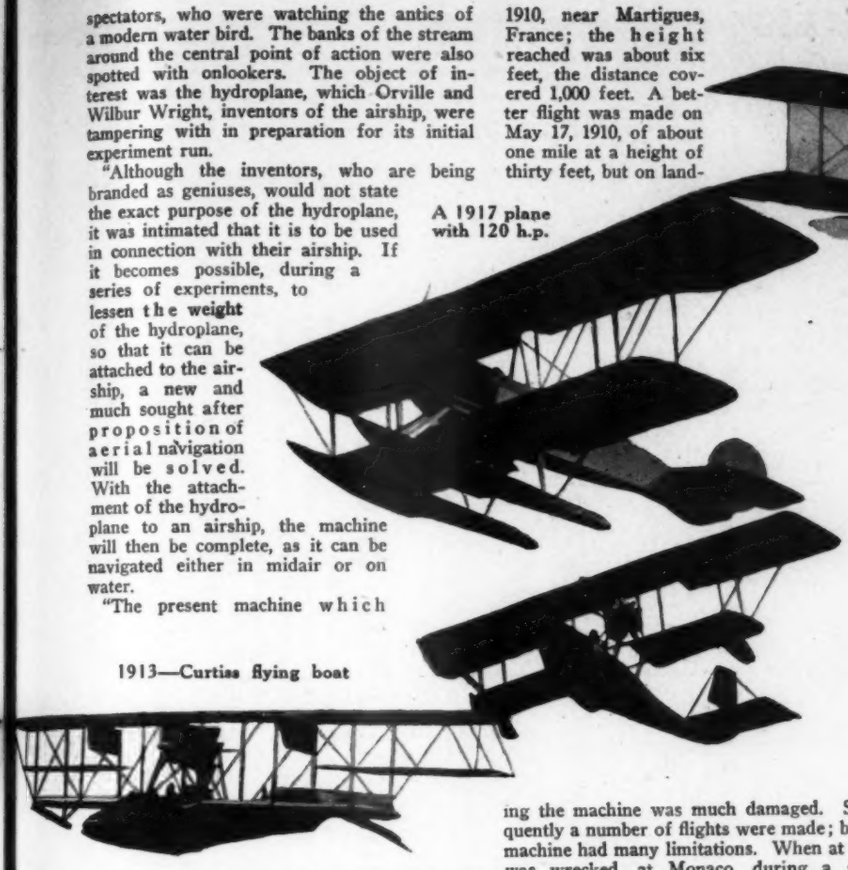
"Although the inventors, who are being branded as geniuses, would not state the exact purpose of the hydroplane, it was intimated that it is to be used in connection with their airship. If it becomes possible, during a series of experiments, to lessen the weight of the hydroplane, so that it can be attached to the airship, a new and much sought after proposition of aerial navigation will be solved. With the attachment of the hydroplane to an airship, the machine will then be complete, as it can be navigated either in midair or on water.

"The present machine which is uniquely constructed from water boilers, an old gasoline engine and numerous strips of wood and sheet iron, with the water planes of copper, made its sail down the Miami River Thursday morning amid the encouraging cheers of the assembled spectators.

"The machine, if the square lines were produced, would be about twelve by eight feet in dimensions. The vehicle is built on two air floats about twelve feet in length. On these is a platform which supports a light wooden frame. On the bed sits the gasoline engine and there remains room enough for four men. The framework supports the two propeller screws which furnish the motive power.

"The hydroplane is steered by a small rudder, which extends backward from the middle of the craft. The water planes, which form the basis of the inventors' idea, are situated between the floats and perpendicular to them. The idea is to have these planes so constructed and set that they will just permit the floats to touch the water enough to keep the structure afloat. The basic idea is much the same as that of ball bearings, which is that of decreasing friction. It is claimed that such a craft, when worked out, will be able to attain a speed of from twenty-five to thirty miles an hour. The present machine is powered with a 20 h.p. engine."

Unfortunately during the very night of the day of this experiment, the dam, which retained the water on which the experiments were made, broke, and the Wrights found it impossible to continue the experiment.



A 1917 plane with 120 h.p.

1913—Curtiss flying boat

1917—A Sturtevant seaplane

The First Flight From the Water

The first to leave the water with a power-driven hydroaeroplane was Henri Fabre, a young French engineer, who, after three years of experiments, constructed a hydroaeroplane of original design fitted with a 50 h.p. Gnome motor, and succeeded in leaving the water, flying and returning to the water without mishap. This first flight took place on March 28, 1910, near Martigues, France; the height reached was about six feet, the distance covered 1,000 feet. A better flight was made on May 17, 1910, of about one mile at a height of thirty feet, but on landing the machine was much damaged. Subsequently a number of flights were made; but the machine had many limitations. When at last it was wrecked, at Monaco, during a storm, Fabre discontinued the experiments. Fabre's floats were a great improvement on the pontoons.

Glenn H. Curtiss' Success

Glenn H. Curtiss was very early impressed with the great advantages of an aeroplane capable of operating from the water. His first machine, the well-known June Bug, built by him as a member of the Aerial Experimental Association, and flown at Hammondsport successfully for the *Scientific American* trophy in 1908, was in the fall of that year equipped with pontoons and operated on Lake Keuka under a new appellation The Loon. This machine was a twin-pontoon machine equipped with separate hydro surfaces placed underneath the floats, but the experiments were unsuccessful.

In 1909, Mr. Curtiss gave the problem much study. In that year he conceived the form of the machine which was to make him famous the world over. His idea was a machine of the single float type with small floats beneath the tips of the wings combined with hydro surfaces, the former to act by displacement to buoy the wing tips up when the machine was standing still and the latter to act when the boat was operating at speed to impart a stabilizing hydro-lift to the wing tips when the machine should become unbalanced. In this way operation at speed on an even keel was assured. The single float was to be centrally placed and was to be provided with hydro-surfaces beneath it. In the early spring of 1910 this machine was built. The main float was a light but strong canoe. Metallic hydroplanes were fitted beneath it fore and aft and suitably braced from the keel and the gunwales of the canoe. The wing tip floats were conically capped tin cylinders. The wing tip hydro surfaces were flexible wooden paddles inclined downwardly and rearwardly. The motor was a standard four-cylinder, 40 h.p. Curtiss motor. Early in May of 1910 this machine was tried on Lake Keuka with wonderful results. The problem of operating at speed upon the surface of the water was proven to be solved. Time and time again the little craft was operated up and down the lake at varying speeds from the lowest to the highest, turning sharply to right and to left with absolute safety and with perfect poise. The flexible paddles connected with the cylinders under the wing tips maintained the machine always on an even keel. The solution of this problem made possible not only safe operation at speed upon the water, but also alighting upon the water from the air.

About this time, Mr. Curtiss made his world-heralded trip from Albany to New York and won the $10,000 prize of the New York *World*. As a preliminary to this he actually equipped a land machine having the usual wheels with potoons and hydro surfaces, and starting from the land took an extended flight through the air and alighted safely upon the surface of the water. With the experience of this achievement he equipped his Hudson Flier with pontoons and hydro surfaces so that should occasion have required he could have landed upon the surface of the water. But so well had he prepared for his flight and so capable was the machine with which he flew that there proved to be no necessity for the use of these devices.

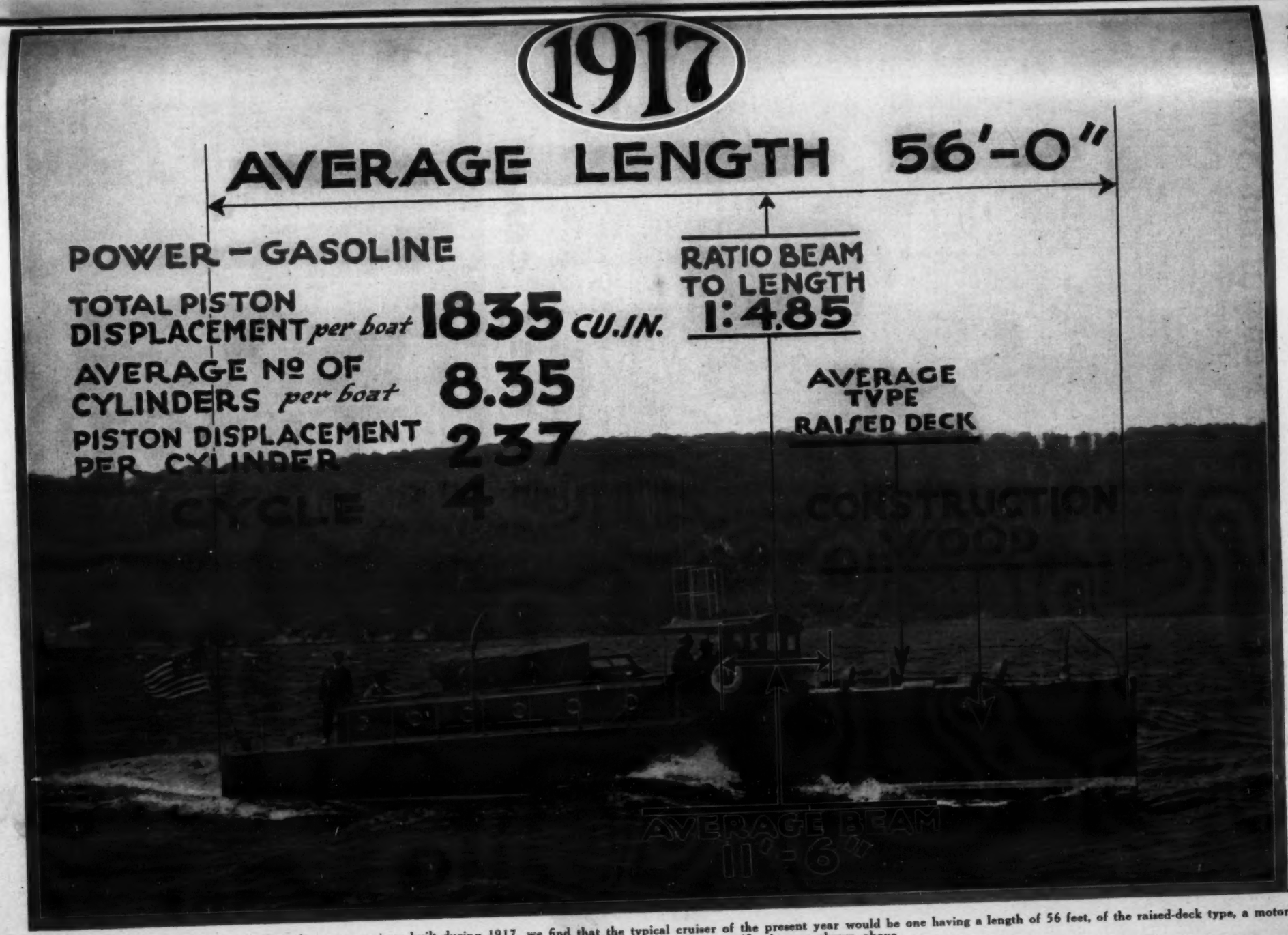
But the small 40 h.p. motor of the canoe machine proved to be too weak to attain that speed necessary for flight, and Mr. Curtiss immediately laid plans for a machine with greater power. That summer while he earned money for his experiments by his daring exhibition work on land machines he kept his shop at Hammondsport busy on the construction of the new machine. The new hydroaeroplane was equipped with a pontoon of the modern streamline form, having a broad, flat hydroplaning bottom and a scow-like bow. Not only was this to have less water and air resistance than the adapted canoe of the former machine, but it was to exert a hydro lift through its own bottom instead of through attached hydros used in the canoe machine. It took time to build such machines then, facilities were not great, and experienced help scarce. But the machine was ready in the late fall, and was immediately shipped to San Diego, California, where Mr. Curtiss had found most excellent climate for winter experiment, and a wonderful stretch of water for tests in the Spanish Bight between North Island and Coronado. Within a fortnight after assembly of the new machine was commenced the Curtiss 60 h.p. motor had propelled the craft from the water to the air and safely back again, and the press had acclaimed to the world the advent of the successful hydroaeroplane. The first public flights were made on January 26, 1911. Already a further improved craft was under way, and within a week after

(*Continued on page 72*)

Typical Motor Cruisers Built in 1907 and 1917

In attempting to convey to our readers some idea of the development of the motor cruiser during the last decade we have shown on these pages a typical trunk cabin cruiser built in 1907 and a raised-deck cruiser of 1917. The average length, beam and power plant details for the two periods were determined from several hundred boats constructed in those years. In 1907 about 70 per cent. of the cruisers built were of the trunk cabin type, while in 1917 about 71 per cent. were of the raised-deck type.

The most noticeable change, other than that of type, is in the power plant. The number of cylinders per boat has more than doubled, and though the cylinder dimensions apparently have not changed, the total piston displacement has nearly doubled, which together with the increased engine speed, shows a marked increase in power. In 1907 only about twelve per cent. of the cruisers were driven by twin screws, while in 1917 this type had increased to thirty-eight per cent.



Averaging the various dimensions of all of the motor cruisers built during 1917, we find that the typical cruiser of the present year would be one having a length of 56 feet, of the raised-deck type, a motor of slightly more than eight cylinders and other specifications as shown above

Which Way Does the Pendulum Swing?

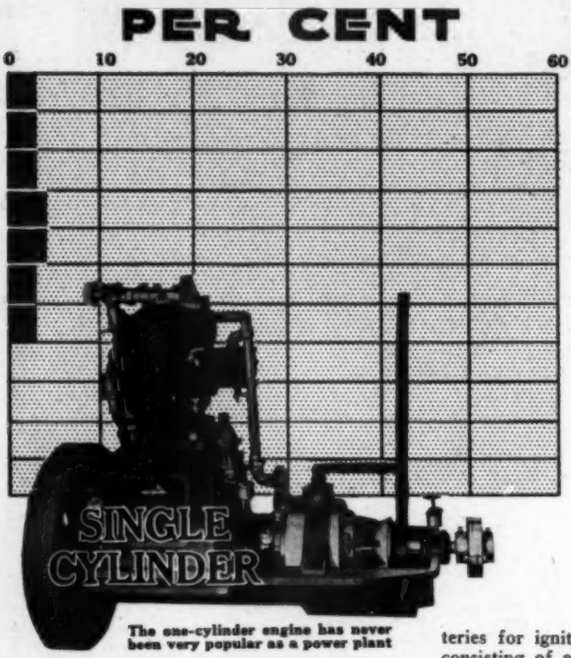
How the Popularity of the Single- and Multi-Cylinder Engines for the Powering of Motor Cruisers Built During the Last Ten Years Has Changed

WHEN the power plant of the modern cruising motor boat is spoken of it immediately brings forward a mind-picture of a twin-screw installation of either six- or eight-cylinder motors complete in every detail and as perfect a piece of mechanism as our most skillful engineers and mechanics can produce, but the power plant of ten years ago was not the highly-developed, reliable motor we have to-day.

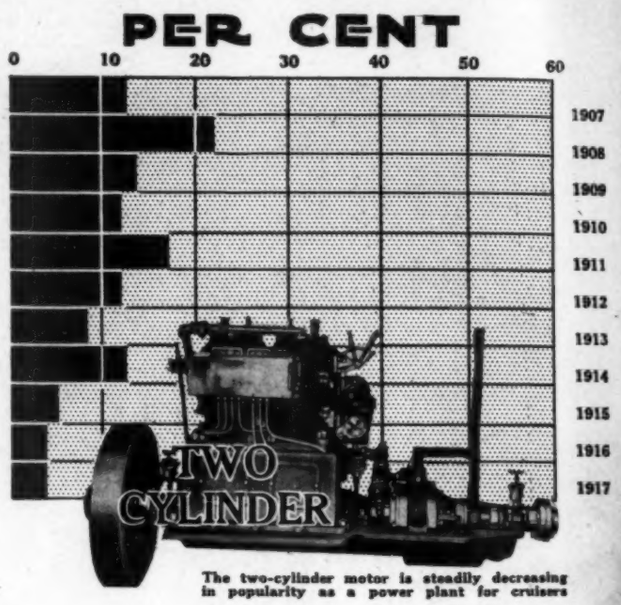
In 1907 the typical power plant was a four-cylinder four-cycle motor having a total piston displacement of about 948 cubic inches. A great many of them had make and break ignition systems, while the rest were equipped with vibrating coils, most of them had low-tension magnetos, the high-tension magneto being practically unknown in marine motor installations. Very few boats were equipped with storage batteries and generators, nearly all depending on dry cells or Edison primary batteries for ignition. The high-tension system, consisting of a non-vibrating coil, a breaker, a distributor and a storage battery, such as the Connecticut or Atwater-Kent systems, and the electric starter are developments of the last few years.

The one-, two- and three-cylinder motors at no time during the last ten years have been very popular for cruisers, and the six- and eight-cylinder engines have attained their present popularity only since the advent of the express cruiser in 1914.

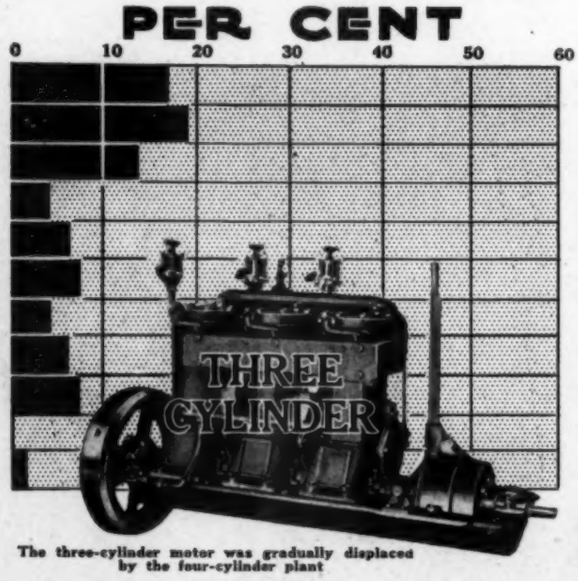
Of the boats built in 1917, about sixty-two per cent. were single screw and thirty-eight per cent. twin-screw installations, while in 1907 only twelve per cent. of the boats were driven by twin screws. Of the power plants installed in 1917, about thirty-six per cent. were six-cylinder, thirty-four per cent. eight-cylinder and twenty-four per cent. four-cylinder motors. The average piston displacement per cylinder is 237 cubic inches, the same as in 1907, but the motors are designed to operate at a much higher speed than those of ten years ago. To-day only two per cent. of the motors are two-cycle machines, showing a decrease of ten per cent. in ten years in the num-



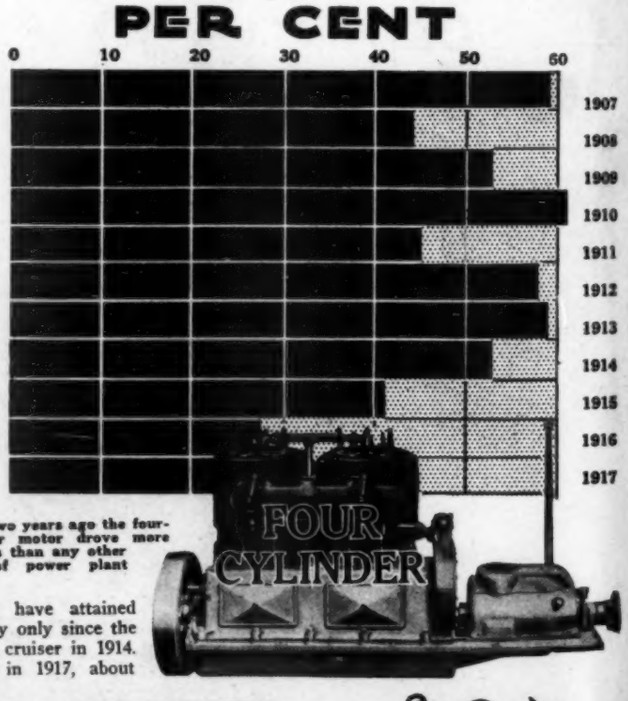
The one-cylinder engine has never been very popular as a power plant



The two-cylinder motor is steadily decreasing in popularity as a power plant for cruisers



The three-cylinder motor was gradually displaced by the four-cylinder plant



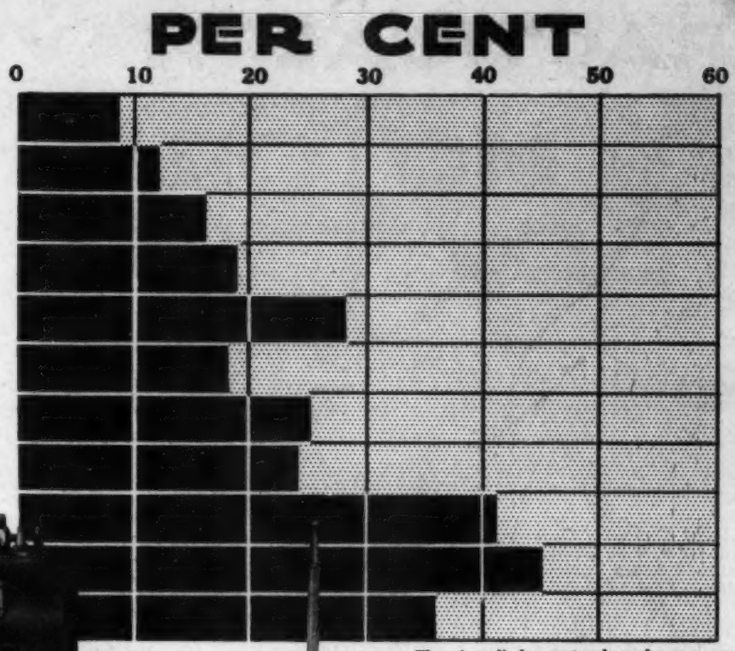
Until two years ago the four-cylinder motor drove more cruisers than any other type of power plant

ber of this type of motors installed in cruisers.

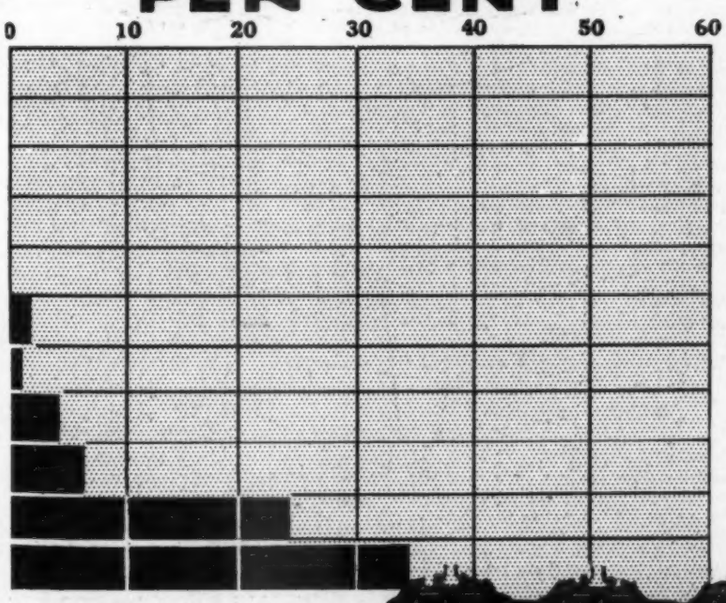
The influence of the high-powered, high-speed scout or patrol cruiser on the power plant is shown by the increase of eight-cylinder motors and a corresponding decrease in the six-cylinder models, and the increase in twin-screw-driven boats.

The typical motor of 1917 is an eight-cylinder model, having a total piston displacement of about 1,896 cubic inches, and designed to run at about 1,000 r.p.m. The equipment includes an electric starter and generator, high-tension magneto, non-vibrating coil system for starting, built-in reverse gear, storage batteries, a carburetor which is self-adjusting for high and low speeds and other auxiliaries, all tending to make the power plant as a whole more reliable and easier to operate.

The diagrams on these pages show graphically the popularity of the various types of power plants installed in new boats during the last ten years and how it varied from year to year. They also show very clearly the effect of the high-powered, high-speed cruiser on the gasoline power plant since 1913.



The six-cylinder motor has shown a more steady gain in popularity than any other model



It took the express cruisers to demonstrate the abilities of this type of motor

The decrease in the use of one-, two- and three-cylinder motors is very noticeable from 1907 to 1913, due to the smoother running and greater reliability of the four- and six-cylinder types.

After the speed and reliability of the express cruiser had been demonstrated in 1914 there was a marked increase in the number of six- and eight-cylinder motors installed. When the power requirements exceed the ability of the eight-cylinder single-screw power plant, twin-screw installations of six- and eight-cylinder motors were resorted to.

The twelve-cylinder motor has been used in light open racing boats with success, but up to the present time is only in the experimental stage as a power plant for a cruiser.

If the demand for higher boat speed and more power continues, there is little doubt that the twelve-cylinder motor will be perfected as a power plant for the larger boats and will be as reliable as the six- and eight-cylinder motors of to-day. Then the typical installation doubtless will be a twin-screw plant with twelve-cylinder motors.

The most noticeable improvement in engine equipment during the last ten years is probably to be found in the reverse gear. The modern power plant has the gear built in as a part of the base, not attached as an afterthought as was the practice in 1907. It is enclosed in an oil-tight case thus saving the oil for the gear, and not lubricating the bilge. As a whole the present-day reverse gear is a well-built, dependable piece of mechanism.

The appearance of the gasoline marine motor as a whole has shown a very marked improvement. The miscellaneous oil cups, oil piping, water piping and other equipment has to a great extent been done away with. All moving parts have been enclosed, thus doing away with a great deal of noise and the splashing of oil all about the engine-room, and the liability of having the engineer's clothing or hands caught in exposed gear wheels.

The improvement in carburetors has been along lines of automatic adjustment to varying engine speeds, especially on high-speed engines, and to some extent for the use of kerosene.

PRACTICAL NAVIGATION

For The MOTOR BOATMAN

Working Dead Reckoning Geographically
Mercator and Polyconic Charts
Middle Latitude Sailing
Effect of Leeway

By W. Mack Angas

IN SEVEN CHAPTERS—Part II

Departure and Difference of Latitude
Dead Reckoning Calculations
Latitude and Longitude
Use of Tables

THE method of working dead reckoning that was described in the first article of this series has two draw-backs which greatly restrict its usefulness: first of all the method is a graphical one and, therefore, cannot be worked without "marking up" a chart, which is, after all not a serious matter when it enables one to make harbor in a fog or heavy rain; and secondly the method as explained and illustrated in detail is only applicable to charts which have scales of miles upon them. The method was described at length because it is useful in some cases, and because it makes use of the polyconic charts with which all motor boatmen are familiar. Before going any further with graphical methods of working dead reckoning and the way of applying them to another kind of chart which is not furnished with a scale of miles, it would be well to take up briefly the principles underlying the more common kinds of charts. Although the Mercator Projection is by far the most important and useful kind of chart known to navigators, it will not be the first kind described here. The average motor boatman is more familiar with the large scale polyconic projection and it will therefore be described first and its limitations shown; then the principle of the Mercator Projection will be explained.

For the purposes of the practical navigator the world may be considered a sphere, the slight flattening of the poles which school geographies lay so much stress upon being altogether too slight to be worthy of consideration in ordinary navigation. Now anyone who has ever in the days of his youth tried to manufacture a baseball, *and cover it*, will realize that a flat surface cannot be fitted to a sphere without much stretching and distorting of the flat surface. The fact that the reverse is true, and a spherical surface cannot be flattened out, can be readily shown with the skin of an orange. But before going into the details of how chart makers represent the features of a sphere on a plane surface it would be well to briefly review the artificial methods of dividing up the earth's surface which have been devised by geographers and navigators to enable them to designate locations.

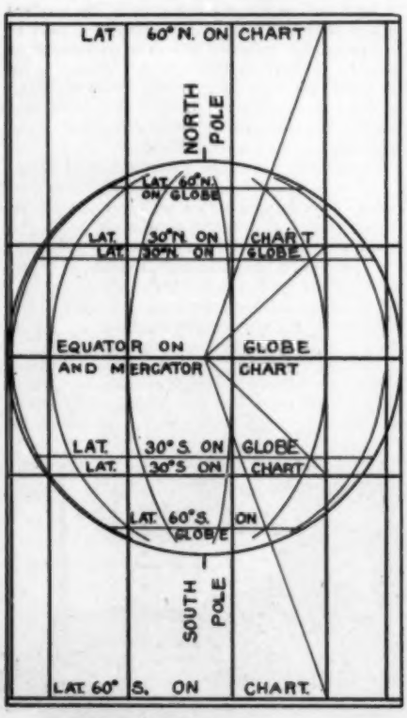


Figure 1.—Principle of the Mercator projection. The features of the globe are projected out from the center of the globe onto a cylinder which is tangent to the globe at the equator and whose axis is the axis of the earth produced. The parallels and meridians project as straight lines at right angles to each other. The cylinder has only to be cut open down a meridian and rolled out flat to give the familiar Mercator chart

Everyone knows that the equator is an imaginary line drawn round the world half way between the poles and that it everywhere runs due east and west and is 90° from both the north and south poles. Now latitude is merely the distance that a place, or ship, is from the equator, expressed in degrees, minutes and seconds of angular measure. To facilitate finding latitude on maps and charts the right angles existing between the equator and the poles have been subdivided into degrees and minutes and through the resulting graduations "parallels of latitude" have been drawn running east and west parallel to the equator and, of course, going round the world. To say that the latitude of New York City Hall is 40° 42′ 44″ N. merely gives the information that the building is situated on a line parallel to the equator and 40 degrees 42 minutes and 44 seconds north of it. No such natural reference line as the equator existed from which to measure longitude, or angular distances east and west, so an arbitrary one had to be chosen and the English speaking world has chosen a "meridian," or line drawn through both poles, running through Greenwich in England as the meridian of 0° longitude. To say that the longitude of New York City Hall is 74° 00′ 24″ W. means that the building lies on a meridian or line drawn through both poles which is 74 degrees 00 minutes and 24 seconds west of the meridian of Greenwich. Just as latitudes are measured north and south so are longitudes measured east and west, with this difference, however, a latitude may be no greater than 90° while eastern and western longitudes

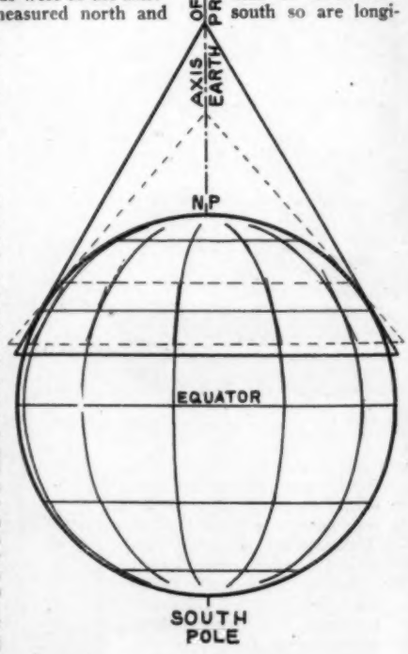
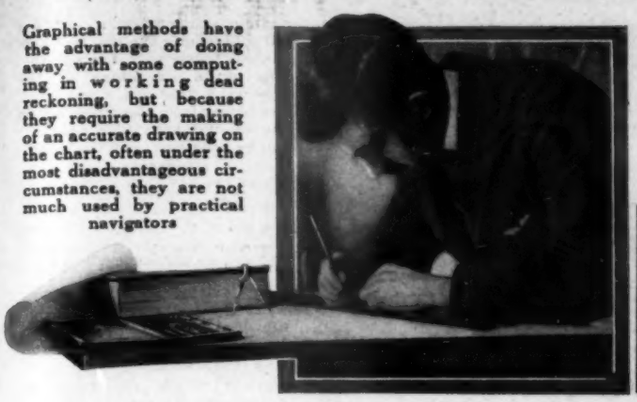
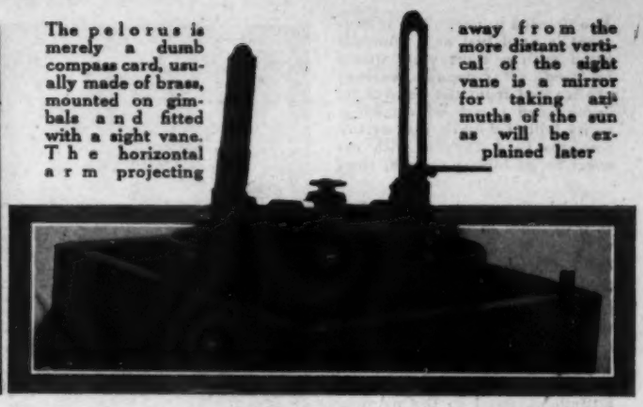


Figure 2.—Principle of the polyconic projection. The part of the globe lying along or close to a certain parallel of latitude is projected onto a cone tangent to the globe at the parallel in question. Fragments cut from these cones when fastened together form the polyconic projection, or projection on many cones. One cone is here shown in full lines, while the cone for a more northerly parallel of latitude is shown dotted. This method is used only for mapping small areas on a large scale, such as our harbor charts, and to which a scale of miles can be applied



Graphical methods have the advantage of doing away with some computing in working dead reckoning, but because they require the making of an accurate drawing on the chart, often under the most disadvantageous circumstances, they are not much used by practical navigators



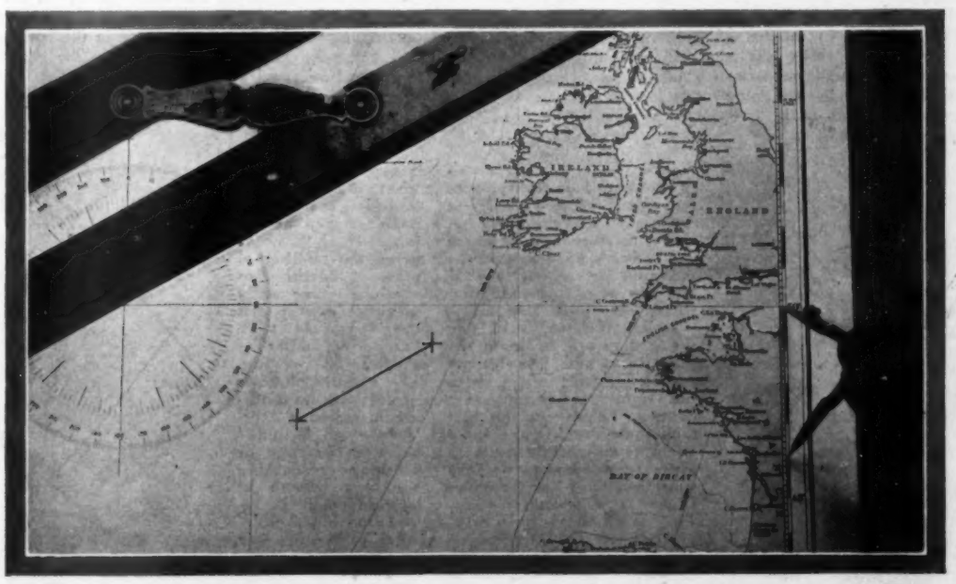
The pelorus is merely a dumb compass card, usually made of brass, mounted on gimbals and fitted with a sight vane. The horizontal arm projecting away from the more distant vertical of the sight vane is a mirror for taking azimuths of the sun as will be explained later

meet on the 180 meridian which is in the Pacific on the other side of the world from Greenwich. A few moments' thought, or better still, a hasty examination of a school room globe will show that the parallels of latitude are everywhere the same distance apart, while the meridians of longitude begin to converge as soon as they leave the equator and all meet at the poles. From this it may be deduced that a minute of latitude is the same length—in miles, feet, yards, or any units of length—in any part of the world while the minute of longitude has the same length as the minute of latitude *on the equator only*. The nautical mile has been made the same length as the minute of latitude, so it follows that a minute of latitude is equal to a nautical mile anywhere, a minute of longitude equals a nautical mile only on the equator. All this is explained fully and concisely in chapter one of Bowditch, and this non-technical explanation should certainly be followed by a careful reading of that chapter.

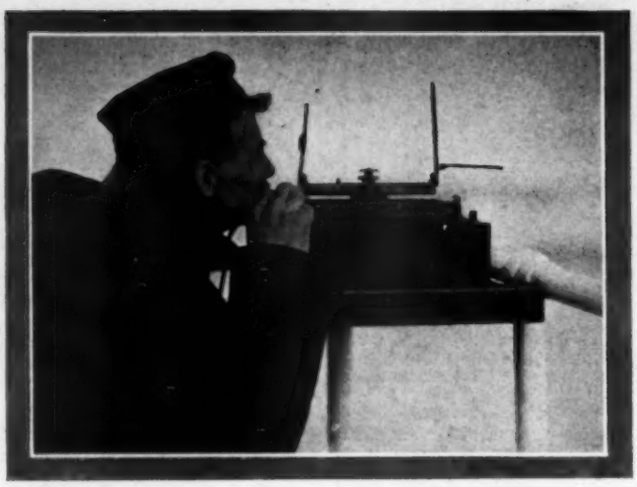
It is also important that the student get a clear conception of what the "rhumb line" is. This is a line which always runs in the same direction on the earth's surface and consequently cuts all the meridians of longitude at the same angle. If one set out from New York and traveled northwest along the rhumb line one would never return to the gay metropolis by the simple process of continuing until the world had been circumnavigated; the continued north-westerly course would merely lead to an interesting spiral performance in the polar regions. One should not get the idea from this, however, that the rhumb line is not used by navigators, for as will be shown later, the line is of immense practical value.

The best starting point from which to take up the principle of the polyconic and Mercator Projection is the globe, for on the globe it is possible to have an undistorted map of the world. Suppose a polyconic projection was to be made of that part of the coast lying between latitude 40° 00′ N. and latitude 40° 30′ N. A paper cone like a misshapen dunce's cap could be fitted to the globe so that it touched the globe all around on the parallel of latitude 40° 00′ N and the part of the coast lying right along the fortieth parallel could be drawn on the cone with little trouble for the paper would almost be in contact with the globe both a little north and a little south of the parallel. When this part of the coast had been mapped the cone could be reformed so as to fit the parallel of latitude 40° 01′ N and the coast along this parallel could then be drawn. When the process had been repeated for each parallel of latitude within the limits of the desired chart, the cone could be unrolled and the small fragment upon which the chart was drawn cut from it. The chart would be a polyconic projection, or a projection on many cones. In this kind of chart there is little distortion of the shape of islands or other physical features of the district mapped, but neither the meridians of longitude nor the parallels of latitude appear as straight lines, and moreover, a line at the top of the chart which runs northeast is not parallel to a line in some other part of the chart which runs in the same direction. For this reason the polyconic system of projection is only used for mapping comparatively small areas on a large scale, the parallels then appear as only very slightly curved and the meridians are practically straight, while lines in different parts of the chart which run in the same direction are to all intents and purposes parallel. Figure 1 shows this principle of the projection of the polyconic chart, but the reader should not suppose that any such method is used in actually drawing the charts, for in practical chart making the same effect is obtained by other methods. All of our harbor charts and other large scale charts equipped with scales of miles are "polyconic".

The Mercator Projection is a much simpler affair than the polyconic. In this method of projection every point on the earth's surface is projected out from the center of the sphere onto a cylinder tangent to the earth at the equator whose axis is parallel to that of the axis of rotation of the earth. A glance at Figure 1 will illustrate the principle and will also show that when the cylinder is cut open down a meridian and unrolled it will give the familiar Mercator Projection on which the parallels of latitude and the meridians of longitude appear as straight lines running at right angles to each other. The invaluable feature of this kind of projection is that the rhumb line appears on it as a straight line and consequently any two lines which run in the same direction but are in different parts of the chart appear parallel. It may seem that these are features that any kind of chart would possess, but some thought on the matter will show that the Mercator is the only kind of chart that really does have them. The familiar polyconic, to be sure, has these features for all practical purposes, but that is only because it covers such a small area that the curvature of the meridians is unnoticeable. The unfortunate feature of the Mercator chart is that it is badly distorted in high latitudes due to the fact that all parallels of latitude appear the same length as the equator. This distortion of the Mercator Projection makes it impossible to equip it with a scale of miles because a scale that would be correct in one latitude on the chart



Measuring or laying off a distance on a Mercator chart. The length of the course between the two crosses is being measured. The distance between the crosses is taken with the dividers and applied to the scale on the edge of the chart with the dividers astraddle of the middle latitude of the course between the crosses. The dividers when applied to the scale in this way stretch just four degrees so the distance is 60 × 4 = 240 miles



The pelorus in use. The instrument is used just as a compass fitted with a sight vane would be used. If compass bearings are wanted from the pelorus its dumb card is set with respect to its lubber's mark just as the compass card appears with respect to its lubber's mark, then as long as the vessel's course is not changed compass bearings can be taken with the pelorus. One great advantage of the pelorus is that the dumb card can be set from the vessel's true course and thus true bearings can be obtained from the instrument

would be incorrect when applied to a distance in some other latitude. To overcome this difficulty it is only necessary to fall back upon the simple relation between the nautical mile and the minute of latitude and use the graduated edge of the chart as a scale of miles, always remembering that the minute of latitude is equal to the nautical mile and that the part of the graduated edge lying directly east or west of the distance being measured is the part of the scale to be used. If some other part of the scale be used, or if the longitude scale engraved at the top and bottom of the chart be used, a more or less serious error will result. The reader is advised to get a Mercator Projection of the north Atlantic, or borrow one, and see for himself what a great difference there is between the length on the chart of a course some sixty or a hundred miles long near the equator and another course of equal length located in a northern latitude; both these courses are the same length in miles but the distortion of the Mercator chart makes them appear of vastly different length on the chart.

The method of working dead reckoning graphically on the Mercator Projection will now be self-evident. It is merely necessary to correct the compass courses and plot the resulting true courses on the chart, using the graduated edge of the chart in laying off the lengths of the courses. In laying off each individual course that part of the graduated edge is to be used which lies due east or due west of the *middle* of the course in question. If the course is long it will be well to lay it off in sections that can be easily stretched with the dividers and the dividers should be reset for each section on that part of the scale on the edge of the chart which lies due east or west of the middle of the section. A photograph illustrates this process of laying off distances on the Mercator Projection and it shows equally well how the distance between two points must be measured on this kind of chart. In measuring the distance between two far distant points it will be necessary to break up the distance into sections that can be easily handled by the dividers and measure each section with the dividers astraddle of the latitude of the middle of the section or the "middle latitude" of the section as it is called. In working with extremely small scale charts, like those of entire oceans, the "reach" of the dividers should not be the limit placed on the length of these sections but a much smaller length should be used. In general no section should be more than about a couple of hundred miles long.

Before going on with the method of working dead reckoning by computation it would be well to explain the effect of leeway on the true course of a sailing vessel. Leeway is the angle between the direction in which a vessel is *heading* and the direction in which she is really moving and is most certainly not a compass error; but as leeway has just the same effect as a compass error it is best dealt with along with those errors. Figure 3 shows a number of vessels sailing in different directions and all making more or less leeway. It should be noticed that all the vessels on the starboard tack—i. e., all vessels whose starboard side is the windward side—are going to the left of their apparent course, or are going to the left of the direction in which they are heading and vessels on the port tack are going to the right of their apparent course. It should be clearly understood that leeway is caused by a bodily sidewise movement of the vessel in which she does not alter the direction in which she is heading but does alter very materially the direction in which she is *going*. A westerly compass error causes a vessel to go to the left of her apparent course so it is only necessary to remember that leeway made on the starboard tack has the same effect as westerly compass error and leeway on the port tack has the same effect as easterly compass error. In correcting the compass courses of sailing vessels the leeway made on each course is taken from the log and entered in a column on the traverse sheet, this leeway is then taken into consideration when the compass error is figured and in this way the leeway is applied to the compass course with little trouble. The leeway is obtained on sailing vessels by the officer of the watch estimating the angle between the center line of the vessel and the wake. An example may make all this clearer: A sailing vessel was on a compass course of WSW½W the wind being south and the leeway 1 point, the variation was 1¼ points west and the deviation ¼ point east, required the true course. The port side of the vessel was the windward side so she was on the port tack and the leeway was therefore equivalent to easterly compass error, the total error was then 1¼ points W minus 1 point E, minus ¼ point east=½ point W, and the true course lay ½ point to the left of WSW½W, and was WSW. Further examples of the application of leeway will be found in problem 1 which is worked both graphically and by computation.

The reader will now be ready to take up the finding of a vessel's position by dead reckoning without any help of drawings made on the chart. To do this it is necessary to make use of the traverse tables as table 1 and table 2 in Bowditch are called. These tables give the "difference of latitude" and the "departure" for courses of different length and direction, table 1 giving the data for courses in mariner's points and quarter points and table 2 for courses in degrees. It will be noticed that table 1 gives this data for courses up to 300 miles in length while table 2 will handle courses up to 600 miles long. Figure 4 shows what a "difference of latitude" is, and makes it clear that it is the number of miles or northing that a vessel makes when she sails some such course as NE½N for a given number of miles, say 25. The "departure" is the number of miles of easting she makes while on the same course. Had the course been SW½S, the "difference of latitude" would have been the number of miles of southing and the "departure" the number of miles of westing. Differences of latitude and departures for courses up to and including four points are found in table 1 by looking for the number of points at the top of the page, checking this by finding the course by name printed somewhere along the top of the page, finding the distance in the column headed "Dist.", and taking the difference of latitude from the column headed "Lat." and the departure from the column headed "Dep." Courses of more

(*Text continued on page 23*)

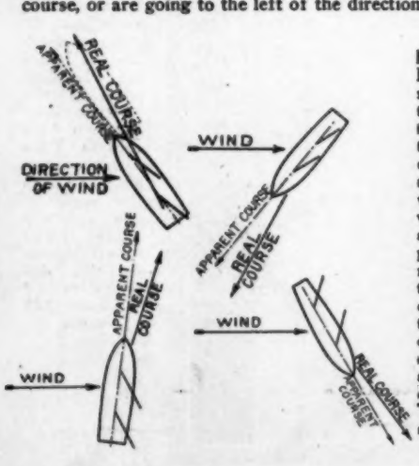


Figure 3—Leeway is generally thought of as the sidewise movement of a vessel, but technically it is the angle between the direction in which the vessel is heading and the direction in which she is actually going. Notice that when the port side of a vessel is the windward side she is then said to be on the port tack and her leeway makes her true course lie to the right of her apparent course. Leeway on the port tack therefore has the same effect as an easterly compass error and leeway on the starboard tack has the same effect as a westerly error. The above rules hold irrespective of the direction of the wind

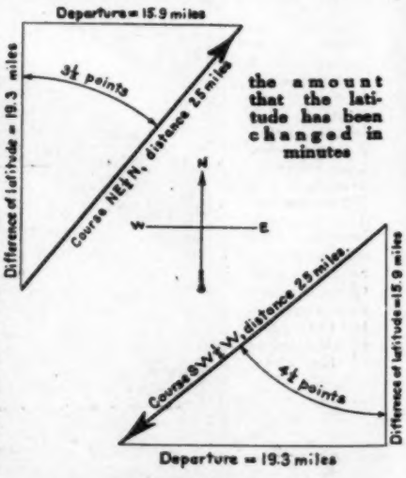


Figure 4—Illustrating what differences of latitude and departures are, the difference of latitude being the number of miles of northing or southing made on a diagonal course and the departure the number of miles of easting or westing. The number of miles of northing or southing is called a "difference of latitude" because the mile of northing or southing equals a minute of latitude and therefore the number of miles of northing or southing made equals the amount that the latitude has been changed in minutes

Problem 1.

A sailing vessel left Latitude 37° 05′ N, Longitude 75° 39′ W and sailed the following courses and distances. Required the new position of the vessel.

Compass Course	Variation	Deviation	Wind	Leeway	Distance
NNE	6°W	3°E	NNW	1½ points	39 naut. miles
NE¼E	6°W	9°E	N	1 "	52 " "
E by S	6°W	8°E	NE	¾ "	37 " "
N by W	6°W	1°E	NE	1½ "	84 " "

The first step in the solution of the problem is to correct the compass courses. Either "magnetic" or "true" courses may be used wtih a graphical method of solution, but for solution by computation the true courses *must* be obtained. Note that the courses in mariner's points are converted into degrees, and the compass error which is a combination of variation, deviation, and leeway is then applied by the old rule "to the left or counterclockwise if westerly." The most satisfactory arrangement of the work is the tabular one given below. The columns headed N, S, E, and W, are for the differences of latitude and the departures of the various courses. Before the differences of latitude and the departures of the courses are looked up in table 2 the squares in the N, S, E, and W columns which are not to be used are crossed out as shown below. This guards against putting a north "lat." in the south column, but does not guard against putting the "lat." in the place where the "dep." should go and vice versa.

Compass Course	Var.	Dev.	Wind	Leeway	Error	True Course	Distance	N	E	S	W
N22°E	6°W	3°E	NNW	17°E	14°E	N36°E	39	31.6	....	22.9	....
N53°E	6°W	9°E	N	11°E	14°E	N67°E	52	20.3	....	47.9	....
S79°E	6°W	8°E	NE	8°E	10°E	S69°E	37	....	13.3	34.5	....
N11°W	6°W	1°E	NE	17°W	22°W	N33°W	84	70.4	....	....	45.7
								122.3	13.3	105.3	45.7
Made good N29°E distance 125 miles								13.3		45.7	
								109.0		59.6	

Point of departure: Lat. = 37° 05′N
Difference of lat. 109′ = 1° 49′N

New position: Lat. 38° 54′N
Lat. left 37° 05′N
New lat. 38° 54′N

Sum 2)75° 59′

Middle latitude 37° 59′ (say 38°)

Longitude 75° 39′W
Diff. long. 76′ = 1° 16′

Longitude 74° 23′W

Position {Lat. 38° 54′N, Long. 74° 23′W}

Note:—The course and distance made good is obtained by looking in table 2 for a place where the difference of latitude made good, 109.0, occurs alongside the departure made good of 59.6. The nearest values obtainable are a "lat." of 109.3 against a "dep." of 60.6 which gives a course of 29° and distance of 125 miles. The difference of longitude is obtained by looking for the departure made good in the "*lat.*" column on the 38° page of table 2 and taking the difference of longitude in minutes out of the distance column.

Problem 2.

A vessel left Latitude 40° 25′ N, Longitude 73° 12′ W and steered 129° p.c.* for 182 nautical miles. The variation of the compass was 10°W and the deviation 4°E. Required the new position by dead reckoning.

* p.c. = by compass.

Adopting the usual form for the computation.

Compass Course	Var.	Dev.	Compass Error	True Course	Distance	N	S	E	W
129°	10°W	4°E	6°W	123°	182	....	99.1	152.6	....

Position left: Latitude 40° 25′N
Diff. of lat = 1° 39′

New position: Latitude 38° 46′N
Old latitude 40° 25′N
New latitude 38° 46′N

Sum 2)79° 11′

Middle latitude 39° 35′ (say 40°)

Longitude 73° 12′W
Diff. of long. 199′ = 3 19′

Longitude 69° 53′W

New position {Lat. 38° 46′N, Long. 69° 53′W}

Note:—No course and distance made good was sought as this is obviously the course and distance which has just been run. In all numerical operations the work has been carried to the "nearest minute," that is decimals of minutes and seconds have been dropped if they amounted to less than half a minute and if they amounted to more than half a minute the whole minutes have been increased by one and the decimal dropped. Thus 99.1′ was treated as 99′. Some epitomes work more accurately than this, but the added trouble and likelihood of mistake is not worth while in working dead reckoning on small vessels. The most precise methods used on large vessels are well illustrated in Bowditch where values are obtained from table 2 by interpolation and middle latitudes are carried to the nearest half degree.

Problem 3.

A vessel left Latitude 37° 41′N Longitude 59° 16′W and ran West (true) for 151 nautical miles. Required her new position.

Position left:

Latitude 37° 41′N
Diff. lat. 0° 00′

New position:
Latitude 37° 41′N

Longitude 59° 16′W
Diff. long. 192′ = 3° 12′

Longitude 62° 28′W

Note:—The course being due West there is no change in latitude and the solution of the problem merely requires the looking up of the difference of longitude brought about by running 151 miles West in Latitude 38°N. The difference of longitude is found as before by looking in table 2 for the 38° page and on this page finding the nearest value to 151 which occurs in the "Lat." column and taking the difference of longitude from the "dist." column.

Problem 4.

At 6:00 a. m. took departure from Jupiter Light, Lat. 26° 57′N, Long. 80° 05′W, bearing 280° true, distant 12 miles, patent log reading 65.0. Set course 32° p.c., variation 0, deviation 6°E, and ran at a speed of about 15 knots until noon when the patent log read 49.0. A current sets 25° true at a rate of about 1.5 knots in this locality. Required the noon position by dead reckoning.

Compass Course	Var.	Dev.	Error	True Course	Distance	N	S	E	W
Course and distance from the light to vessel when taking dept.				100°	12	....	2.1	11.8	....
32°	0°	6°E	6°E	38°	84	66.2	....	51.7	....
Allowance for current				25°	1.5 x 6 = 9	8.2	....	3.8	....
						74.4	2.1	67.3	
Made good 43° distance 99 miles						2.1			
						72.3		67.3	

Point of departure: Lat. 26° 57′N
Difl. of Lat. 72′ = 1° 12′

New position: Lat. 28° 09′N
Old. lat. 26° 57′N
New lat. 28° 09′N

Sum 2)55° 06′

Middle latitude 27° 33′ (say 28°)

Long. 80° 05′W
Diff. long. 76′ = 1° 16′

Long. 78° 49′W

Position {Lat. 28° 09′N, Long. 78° 49′W}

Note:—Patent logs only have dials reading to 100 nautical miles. In this case the boat had run approximately 15 x 6 = 90 miles, so the distance as obtained from the log is 149 — 65 = 84 nautical miles.

Problem 5.

Took departure from Cape Henry Lighthouse, Lat. 36° 56′N, Long. 76° 00′W, bearing 190° p.c. distant 3 miles, the vessel heading 100° p.c. when departure was taken, upon which course the deviation is 4°W. Set course 100° p.c. and ran for 125 nautical miles while a current carried the vessel 30° true for 11 miles. The variation of the compass was 6°W. Required the position by dead reckoning.

Compass Course	Var.	Dev.	Error	True Course	Distance	N	S	E	W
10°	6°W	4°W	10°W	0°	3	3.0	....	....	....
100°	6°W	4°W	10°W	90°	125	....	....	125.0	....
Allowance for current				30°	11	9.5	....	5.5	....
Made good 85° distance 131						12.5		130.5	

Point of departure: Lat. 36° 56′N
Diff. lat. 12′

New position: Latitude 37° 08′N

Long. 76° 00′W
Diff. long. 163′ = 2° 43′

Longitude 73° 17′W

Middle latitude by inspection 37°

Note:—When a course is either due North, South, East, or West the traverse tables are not used in getting the "Lat." and "dep.," for one of these quantities is zero and the other equals the distance.

(*Continued from page 22*)

than four points are found by looking for the number of points at the foot of the page, finding the distance in the column footed "Dist." and taking the difference of latitude from the column which has "Lat." printed at its *foot*, and the departure from the column which has "Dep." printed at its *foot*. It will be noticed that the column that is a "Lat." column when reading from the top of the page is a "Dep." column when reading from the bottom. It is a very common mistake with beginners to take the difference of latitude from the "Dep." column when working with more than a four-point course and this mistake the reader should

(*Continued on page 60*)

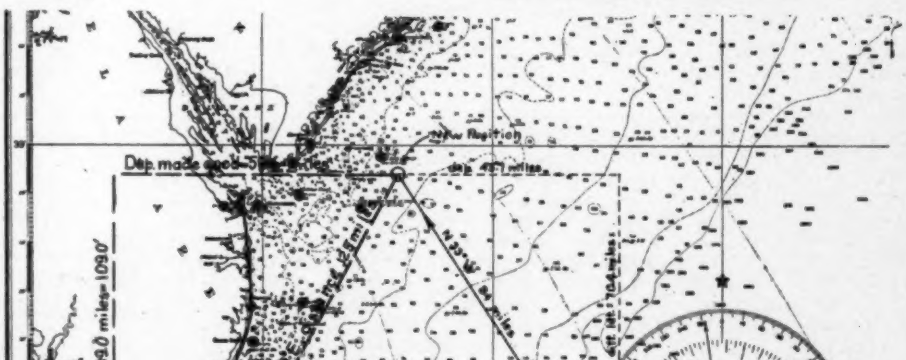


Figure 5—Methods illustrating the location of one's position by dead reckoning

How Racing Speeds

The Result of Careful Work, Not Luck

FEW, if any, modes of locomotion have made the upward strides in speed as has the motor boat in the last ten years. Over 100 per cent. increase in speed in a decade is a record which may never again be surpassed on land or sea or in the air above or in the water beneath. From a meager 27.8 miles an hour in 1907—a speed which to-day is exceeded by many of the express-cruiser type of boats, up to a nearly mile-a-minute rate is the record in competition. In the spurts against time over a measured-mile course, the mile-a-minute rate has even been exceeded.

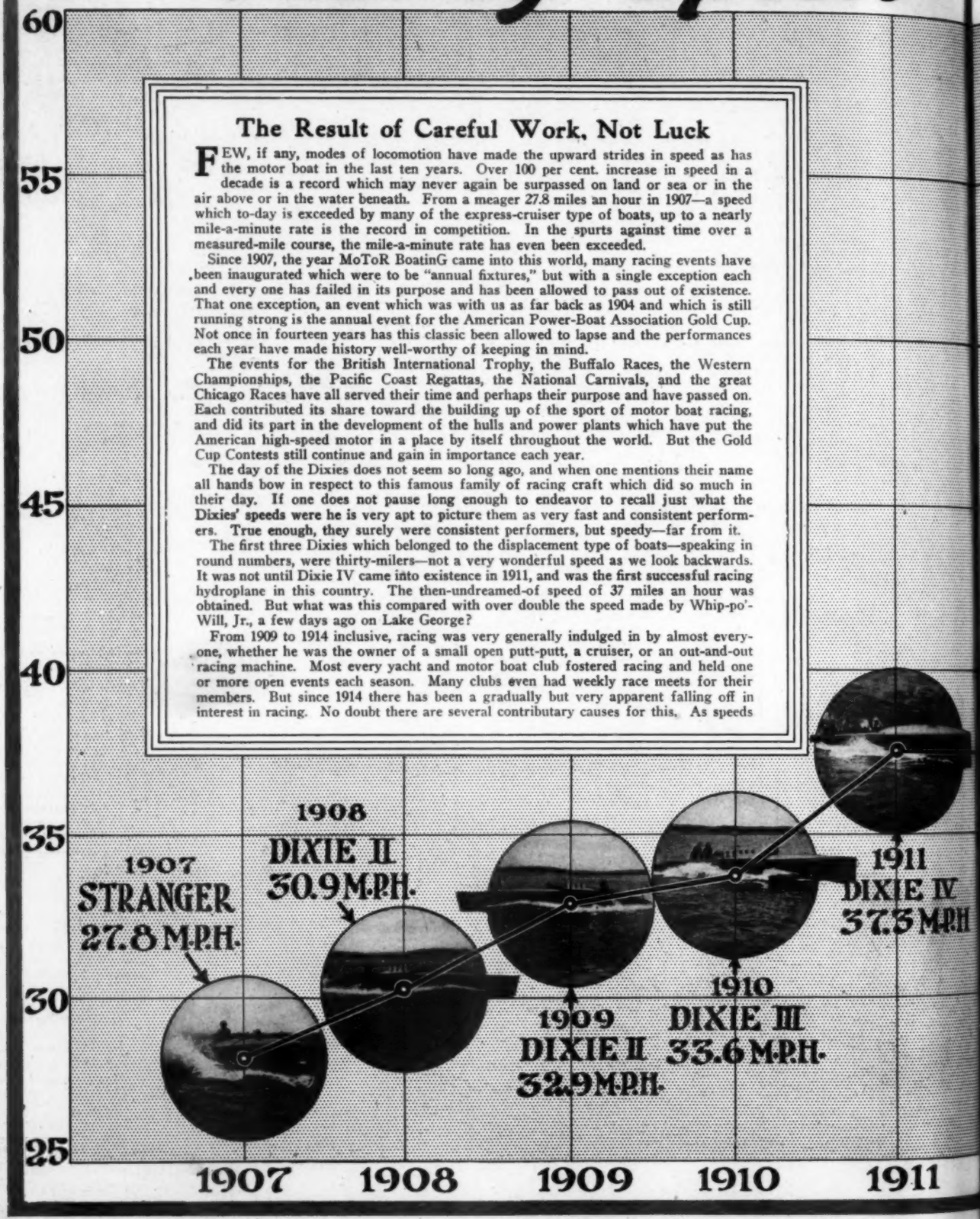
Since 1907, the year MoToR BoatinG came into this world, many racing events have been inaugurated which were to be "annual fixtures," but with a single exception each and every one has failed in its purpose and has been allowed to pass out of existence. That one exception, an event which was with us as far back as 1904 and which is still running strong is the annual event for the American Power-Boat Association Gold Cup. Not once in fourteen years has this classic been allowed to lapse and the performances each year have made history well-worthy of keeping in mind.

The events for the British International Trophy, the Buffalo Races, the Western Championships, the Pacific Coast Regattas, the National Carnivals, and the great Chicago Races have all served their time and perhaps their purpose and have passed on. Each contributed its share toward the building up of the sport of motor boat racing, and did its part in the development of the hulls and power plants which have put the American high-speed motor in a place by itself throughout the world. But the Gold Cup Contests still continue and gain in importance each year.

The day of the Dixies does not seem so long ago, and when one mentions their name all hands bow in respect to this famous family of racing craft which did so much in their day. If one does not pause long enough to endeavor to recall just what the Dixies' speeds were he is very apt to picture them as very fast and consistent performers. True enough, they surely were consistent performers, but speedy—far from it.

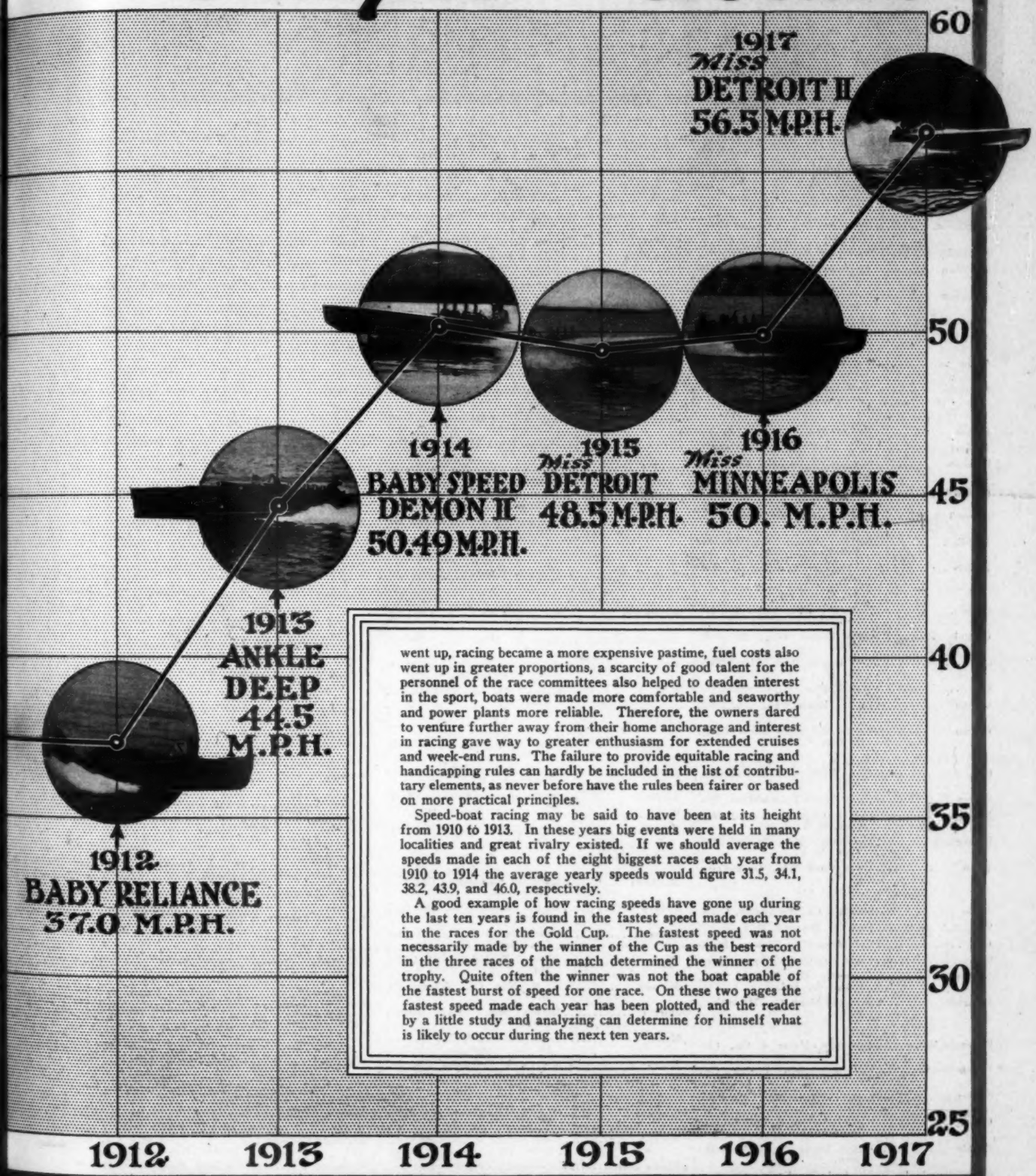
The first three Dixies which belonged to the displacement type of boats—speaking in round numbers, were thirty-milers—not a very wonderful speed as we look backwards. It was not until Dixie IV came into existence in 1911, and was the first successful racing hydroplane in this country. The then-undreamed-of speed of 37 miles an hour was obtained. But what was this compared with over double the speed made by Whip-po'-Will, Jr., a few days ago on Lake George?

From 1909 to 1914 inclusive, racing was very generally indulged in by almost everyone, whether he was the owner of a small open putt-putt, a cruiser, or an out-and-out racing machine. Most every yacht and motor boat club fostered racing and held one or more open events each season. Many clubs even had weekly race meets for their members. But since 1914 there has been a gradually but very apparent falling off in interest in racing. No doubt there are several contributary causes for this. As speeds



Curves showing how the speeds of racing motor boats have increased during the last ten years in the annual races for the American Power-Boat three races which constitutes the match each year. The races for the Gold Cup are conducted each year by the club in whose

Have Jumped In A Decade



went up, racing became a more expensive pastime, fuel costs also went up in greater proportions, a scarcity of good talent for the personnel of the race committees also helped to deaden interest in the sport, boats were made more comfortable and seaworthy and power plants more reliable. Therefore, the owners dared to venture further away from their home anchorage and interest in racing gave way to greater enthusiasm for extended cruises and week-end runs. The failure to provide equitable racing and handicapping rules can hardly be included in the list of contributary elements, as never before have the rules been fairer or based on more practical principles.

Speed-boat racing may be said to have been at its height from 1910 to 1913. In these years big events were held in many localities and great rivalry existed. If we should average the speeds made in each of the eight biggest races each year from 1910 to 1914 the average yearly speeds would figure 31.5, 34.1, 38.2, 43.9, and 46.0, respectively.

A good example of how racing speeds have gone up during the last ten years is found in the fastest speed made each year in the races for the Gold Cup. The fastest speed was not necessarily made by the winner of the Cup as the best record in the three races of the match determined the winner of the trophy. Quite often the winner was not the boat capable of the fastest burst of speed for one race. On these two pages the fastest speed made each year has been plotted, and the reader by a little study and analyzing can determine for himself what is likely to occur during the next ten years.

Association Gold Cup. The illustrations of the boats and the speeds shown represent those boats which made the fastest speed in one of the locality the races are held. The A. P. B. A. itself is not a racing body and therefore has no part in the details of arrangements, etc.

AMERICAN MARINE MOTORS AND THEIR MANUFACTURERS

An Alphabetical List of the Makes of Motors Included in the Following Tables with the Names and Addresses of Their Manufacturers

NAME OF MOTOR	NAME OF MANUFACTURER
Able	Able Engine Co., Inc., New York City
Aerothrust	Aerothrust Engine Co., La Porte, Ind.
Alexander & Cox	Alexander & Cox, Chicago, Ill.
American	American Engine Co., Detroit, Mich.
Anderson	Anderson Engine Co., Chicago, Ill.
Aristocrat	Carson Motor Co., Detroit, Mich.
Aristox	Black Rock Mfg. Co., Bridgeport, Conn.
Arrow	Arrow Motor & Machine Co., Inc., New York City.
Automatic	Automatic Machine Co., Bridgeport, Conn.
Barber	Barber Bros., Syracuse, N. Y.
Barker	C. L. Barker, Norwalk, Conn.
Brennan	Brennan Motor Mfg. Co., Syracuse, N. Y.
Bridgeport	Bridgeport Motor Co., Bridgeport, Conn.
Brown-Talbot	Brown-Talbot Machinery Co., Salem, Mass.
Bud-E.	Carlyle Johnson Machine Co., Manchester, Conn.
Buffalo	Buffalo Gasoline Motor Co., Buffalo, N. Y.
Caille	Caille Perfection Motor Co., Detroit, Mich.
Capitol	Auto Engine Wks., St. Paul, Minn.
Carl	Carl Engine Wks., Philadelphia, Pa.
Clay	Clay Engine Co., Cleveland, O.
Clifton	Clifton Motor Wks., Cincinnati, O.
Curtiss	Curtiss Aeroplane Motor Corp., Buffalo, N. Y.
Dice	Dice Machine Co., Anderson, Ind.
Doman	H. C. Doman Co., Oshkosh, Wis.
Driggs	Driggs Ordnance Corp., New York, N. Y.
Duesenberg	Duesenberg Motors Corp., New York, N. Y.
Dunn	Dunn Motor Wks., Ogdensburg, N. Y.
Eagle	Standard Co., Torrington, Conn.
Elco	Elco Co., Bayonne, N. J.
Erd	Erd Motor Co., Saginaw, Mich.
Essex	Essex Engine Co., Lynn, Mass.
Evansville	Evansville Gas Engine Wks., Evansville, Ind.
Evinrude	Evinrude Motor Co., Milwaukee, Wis.
Fairbanks-Morse	Fairbanks, Morse & Co., Chicago, Ill.
Fay & Bowen	Fay & Bowen Engine Co., Geneva, N. Y.
Fisherman	Loane Engineering Co., Baltimore, Md.
Foreman	Foreman Motor & Machine Co., Toronto, Can.
Frisbie	Frisbie Motor Co., Middletown, Conn.
Frisco Standard	Standard Gas Engine Co., San Francisco, Cal.
Fulton	Fulton Mfg. Co., Erie, Pa.
Gaeth	Gaeth Motor Co., Chicago, Ill.
John R. Gardner	Lakeland Motor Wks., Lakeland, Mich.
Gray	Gray Motor Co., Detroit, Mich.
Gray-Prior	Gray & Prior Mach. Co., Hartford, Conn.
Grizzly Bear	Parrott & Hahn, Olympia, Wash.
Guarantee	Guarantee Motor Co., Hamilton Ont.
Hall	Hall Gas Engine Co., Inc., Bridesburg, Phila., Pa.
Harris	Harris Engine Co., Wilmington, Del.
Hartford	Gray & Prior Machine Co., Hartford, Conn.
Hatch	Ingram Hatch Motor Corp., New York City
Hettinger	Hettinger Engine Co., Bridgeton, N. J.
Hubbard	Hubbard Motor Co., Inc., Middletown, Conn.
Hunter	Everett Hunter Boat Co., McHenry, Ill.
Joymotor	Joymotor Sales Co., Chicago, Ill.
Kahlenberg	Kahlenberg Bros. Co., Two Rivers, Wis.
Kermath	Kermath Mfg. Co., Detroit, Mich.
Knox	Camden Anchor-Rockland Mach. Co., Camden, Me.
Koban	Koban Mfg. Co., Milwaukee, Wis.
Lathrop	J. W. Lathrop Co., Inc., Mystic, Conn.
Leary	Leary Gasoline Engine Co., Rochester, N. Y.
Leighton	H. J. Leighton, Syracuse, N. Y.
Lisk	Geo. A. Lisk, Detroit, Mich.
L-A	Lockwood-Ash Motor Co., Jackson, Mich.
Matthews	Matthews Engineering Co., Port Clinton, O.
Mianus	Mianus Motor Wks., Stamford, Conn.
Miller	Miller Gas & Vacuum Engine Co., Chicago, Ill.
Missouri	Missouri Engine Co., St. Louis, Mo.
Mohawk	S. R. Mfg. Co., Schenectady, N. Y.
Morton	Morton Motor Co., Detroit, Mich.
Motorgo	Sears, Roebuck & Co., Chicago, Ill.
Murray & Tregurtha	Murray & Tregurtha Co., So. Boston, Mass.
Niagara	Niagara Motors Corp., Dunkirk, N. Y.
Nieland	J. E. Nieland & Co., San Francisco, Cal.
Niseco Diesel	New London Ship & Engine Co., Groton, Conn.
Northwestern	Northwestern Motor Co., Eau Claire, Wis.
Ontario	A. E. Olmstead & Sons, Pulaski, N. Y.
Palmer	Palmer Bros., Cos Cob, Conn.
Peerless	Peerless Marine Motor Co., Buffalo, N. Y.
Philadelphia	Central Machine Co., Philadelphia, Pa.
Pierce-Budd	Pierce-Budd Co., Bay City, Mich.
Porto	Arrow Motor & Machine Co., New York, N. Y.
Ralaco	S. M. Jones Co., Toledo, O.
Rathburn	Rathburn-Jones Engineering Co., Toledo, O.
Red Wing	Red Wing Motor Co., Red Wing, Minn.
Regal	Regal Gasoline Engine Co., Coldwater, Mich.
Reliable	Reliable Engine Co., Portsmouth, O.
Remington	Remington Oil Engine Co., Stamford, Conn.
Roberts	Roberts Motor Mfg. Co., Sandusky, O.
Scripps	Scripps Motor Co., Detroit, Mich.
Sagamore	Sagamore Motor Wks., W. Lynn, Mass.
Smalley	Smalley General Co., Bay City, Mich.
Snapper	Automatic Machine Co., Bridgeport, Conn.
Speedway	Gas Engine & Power Co. & Chas. L. Seabury & Co., Cons., Morris Heights, N. Y.
Standard	Standard Motor Const. Co., Jersey City, N. J.
Standard Oil	Standard Oil Engine Co., Bridgeport, Conn.
Stanley	Stanley Co., Salem, Mass.
Sterling	Sterling Engine Co., Buffalo, N. Y.
Strang	Strang Engine Co., Harvey, Ill.
Sturtevant	B. F. Sturtevant Co., Boston, Mass.
Thomas	Thomas Aeromotor Co., Inc., Ithaca, N. Y.
Toledo	Universal Mach. Co., Bowling Green, O.
Twentieth Century	New York Yacht, Launch & Engine Co., Morris Heights, N. Y.
Universal	Universal Motor Co., Oshkosh, Wis.
Vim	Vim Motor Co., Sandusky, O.
Vulcan	Vulcan Engine Wks., Philadelphia, Pa.
Waterman	Arrow Motor & Mach. Co., New York, N. Y.
Watertown	Gillespie Mfg. Co., Jersey City, N. J.
Wisconsin	Wisconsin Machinery & Mfg. Co., Milwaukee, Wis.
Wisconsin Consistent	Wisconsin Motor Mfg. Co., Milwaukee, Wis.
Wolverine	Wolverine Motor Wks., Bridgeport, Conn.
Wood & Chute	Wood & Chute Machine Co., Greenport, N. Y.

THE TWO-CYCLE MOTORS OF NINETEEN EIGHTEEN

It is MoToR BoatinG's purpose in offering these tables to its readers to provide a comprehensive index and directory for the ready reference of an engine purchaser. It is possible for the reader to tell at a glance exactly what the American market has to offer in any desired horsepower, whether it comes in one, two or more cylinders, and he is thus enabled to compare the specifications of rival makes of motors with the utmost ease.

The initials used under the valve location column are those commonly adopted for differentiating among motors having all the valves on one side, valves on opposite sides, valves in the head, or intakes in the head and exhausts on the side (L, T, H and H & S respectively). A detailed explanation of the initials under the ignition column may be necessary, however. The material from which these tables are compiled comes, naturally, from the engine makers themselves, and under the ignition heading particularly the information is likely to differ in meaning. In the main, however, the information is complete on this score.

The initials J. S. stand, therefore, for jump spark and the letters M. B. for make and break. When M. occurs it denotes that a magneto is regularly supplied. D. is an abbreviation for distributor. The form J. S. & M. B. indicates that both types of ignition are regularly provided, while J. S. or M. B. shows that either jump spark or make and break will be supplied at the option of the purchaser. The ignition designations used for oil engines are H. R., meaning hot retort; H. P., hot plug, and H. B. meaning hot bulb. Diesel and Semi-Diesel are self-explanatory.—EDITOR.

Under 6 Horsepower

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
1¼	Barker	1	3⅛x 3½	...	...	..	M. B.
1½	Alexander & Cox	1	3⅛x 3	600	...	3	J. S. M.
1½	Eagle	1	3 x 3	600	95	2	M. B.
1½	Hubbard	1	3½x 3½	650	164	2	M. B.
2	American	1	3 x 3½	...	...	..	J. S.
2	Evinrude	1	2¾x 2½	750	35	2	J. S. M.
2	Joymotor	1	2¾x 2½	1,000	48	..	J. S. M.
2	Northwestern	1	3 x 3	800	...	..	J. S.
2	Ontario	1	2¾x 2½	900	70	2	J. S. or M.
2	Palmer	1	3¼x 3½	500	135	3	M. B.
2½	Barber	1	3¼x 3½	750	...	3	J. S.
2½	Barker	1	4¼x 4¼	...	...	..	M. B.
2½	Bridgeport	1	3¾x 4	500	140	2-3	Optional
2½	Hubbard	1	3¾x 4	600	194	2	M. B.
2½	L-A	1	3½x 3½	700	...	2	J. S.
2½	Miller	1	2¾x 3½	900	70	3	J. S. M.
2½	Motorgo	1	3¼x 3½	800	148	2	J. S.
2½	Palmer	1	3¾x 3½	700	125	3	J. S.
3	Aerothrust	2	2½x 2¾	1,800	...	2	J. S. & M.
3	Alexander & Cox	2	3⅛x 3	600	...	3	J. S. M.
3	Essex	1	3¾x 4¼	500	175	..	M. B.
3	Gardner, John R.	1	3½x 3½	700	...	3	J. S. D.
3	Guarantee	1	3¾x 3½	...	...	..	.....
3	Gray	1	3½x 3½	1,100	139	3	J. S. D. or M.
3	Hubbard	1	4 x 4¼	550	250	2	M. B.
3	Kahlenberg	1	.....	600	125	2	M. B.
3	Knox	1	4 x 4	...	240	2-3	Optional
3	Koban	2	2⅛x 2⅛	900	24	2	J. S. M.
3	Lathrop	1	4 x 4	500	...	2	Optional
3	Mianus	1	4 x 4	550	193	2	M. B. M.
3	Ontario	1	3½x 3½	900	125	3	J. S. or M.
3	Sagamore	1	4 x 4	600	140	..	M. B. or J. S.
3	Snapper	1	4¼x 4	...	205	..	M. B.
3	Stanley	1	4 x 3½	500	208	2	M. B. M.
3	Toledo	1	3½x 3½	750	140	..	J. S.
3½	Eagle	1	3¼x 3¾	1,000	108	3	J. S. D.
3½	Fulton	1	3¾x 4	650	160	3	J. S.
3½	Mohawk	1	3½x 3¾	900	...	..	J. S. M.
4	American	1	3⅞x 3½	...	...	..	J. S.
4	Barber	1	4 x 4	600	...	3	J. S.
4	Barker	1	4⅛x 5	...	...	..	M. B.
4	Bridgeport	1	4½x 5	500	225	2-3	Optional
4	Gardner, John R.	1	4 x 4	700	...	3	J. S. D.
4	Hubbard	1	4½x 5	525	305	2	M. B.
4	Kahlenberg	1	.....	550	160	2	M. B.
4	L-A	1	4 x 4	700	...	2	J. S.
4	Lathrop	1	4½x 5	500	...	2	Optional
4	Motorgo	1	4 x 4	800	185	2	J. S.
4	Northwestern	1	4 x 4½	700	...	..	J. S.
4	Palmer	1	4½x 4½	450	240	2	M. B.
4	Palmer	1	4½x 4½	650	210	3	J. S.
4	Pierce-Budd	1	4 x 4	1,200	125	2-3	J. S. D.
4	Roberts	1	3½x 4	1,000	113	3	J. S. D. or M.
4	Wisconsin	1	4 x 4	700	185	3	J. S. M.
4½	Essex	1	4½x 5½	500	267	..	M. B.
4½	Knox	1	4¼x 4½	...	280	2-3	Optional
5	Aerothrust	2	3 x 3½	1,250	...	2	J. S. & M.
5	Barber	2	3¼x 3¼	750	...	3	J. S.
5	Bridgeport	1	5¼x 5¼	500	260	2-3	Optional
5	Brown-Talbot	1	4 x 4	750	200	2	J. S.
5	Bud-E	2	3 x 3	1,200	110	3	J. S. M.
5	Eagle	1	4½x 4	800	210	2-3	J. S. or M. B.
5	Evinrude	2	2¾x 2½	1,200	50	2	J. S. M.
5	Fay & Bowen	1	4½x 4½	550	330	2	M. B.
5	Fulton	1	4½x 5	600	285	3	J. S.
5	Guarantee	1	4½x 4½	...	...	..	.....
5	Hartford	1	4 x 4½	700	220	2	M. B.
5	Hubbard	1	5 x 5½	475	385	2	M. B.
5	Lathrop	1	5⅛x 5	500	...	2	Optional
5	Mianus	1	4⅛x 5	500	322	2	M. B. M.
5	Miller	2	2¾x 2½	900	110	3	J. S. M.
5	Mohawk	1	4½x 4½	500	...	..	J. S. M.
5	Palmer	2	3¾x 3½	700	180	3	J. S.
5	Sagamore	1	4⅜x 5	550	250	..	M. B. or J. S.
5	Snapper	1	5⅛x 5	...	340	..	M. B.
5	Stanley	1	4½x 5	500	307	2	M. B. M.
5	Vim	1	4 x 4	750	172	3	J. S. D.
5½	Eagle	1	5 x 6	450	470	2	M. B.
5½	Gray	1	4½x 4½	1,100	240	3	J. S. D. or M.
5½	Knox	1	5 x 5¼	...	380	2-3	Optional
5½	Palmer	1	5 x 6	450	325	3	M. B.

6 to 7½ Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
6	American	1	4⅛x 4½	...	...	..	J. S.
6	Barber	1	4¼x 4¼	600	...	3	J. S.
6	Eagle	1	4½x 4	900	220	3	J. S. D.
6	Eagle	1	4½x 5	600	320	2	J. S. or M. B.
6	Essex	1	5 x 6	450	365	..	M. B.
6	Foreman	2	3½x 3½	800	210	3	J. S. D.

6 to 7½ Horsepower Inclusive—(Continued)

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
6	Gardner, John R.	2	3½x 3½	750	...	3	J. S. D.
6	Gray	2	3½x 3½	1,100	185	3	J. S. D. or M.
6	Guarantee	2	3¾x 3½	...	...	..	.....
6	Kahlenberg	1	.....	400	400	2	M. B. M.
6	Knox	2	4 x 4	...	350	2-3	Optional
6	L-A	2	3½x 3½	700	...	2	J. S.
6	Lathrop	1	5½x 5	500	...	2	Optional
6	Lathrop	1	5⅛x 6½	400	...	2	Optional
6	Mianus	2	4 x 4	550	342	2	M. B. M.
6	Mianus	1	4⅜x 5	700	312	2-3	J. S. M.
6	Mohawk	1	4½x 3¾	1,200	...	..	J. S. M.
6	Mohawk	1	4½x 4½	700	...	..	J. S. M.
6	Motorgo	2	3½x 3½	800	210	2	J. S.
6	Ontario	2	3½x 3½	900	190	3	J. S. or M.
6	Palmer	1	5 x 6	400	350	2	M. B.
6	Palmer	1	5 x 6	625	325	3	J. S.
6	Sagamore	1	4⅞x 5	550	260	..	M. B. or J. S.
6	Sagamore	2	4 x 4	600	250	..	M. B. or J. S.
6	Smalley	1	4½x 4½	950	...	3	J. S.
6	Stanley	2	4 x 3½	500	346	2	M. B. M.
6	Toledo	1	4½x 4½	750	200	..	J. S.
6	Vim	2	3½x 3½	750	197	3	J. S. D.
6	Vim	1	5 x 5	450	330	3	J. S.
6	Wisconsin	1	4½x 4½	700	235	..	J. S. M.
6½	Barker	1	5½x 6½	...	...	..	M. B.
7	Bridgeport	1	5½x 6	450	420	2-3	Optional
7	Eagle	2	3¾x 3¼	1,000	190	3	J. S. D.
7	Eagle	1	6 x 6½	400	625	2	M. B.
7	Fulton	2	3¾x 4	650	265	3	J. S.
7	Guarantee	1	5 x 5	...	...	..	.....
7	Hubbard	1	6 x 8½	400	557	2	M. B.
7	Hubbard	2	4 x 4¼	550	395	2	M. B.
7	Kahlenberg	1	.....	400	500	2	M. B. M.
7	Lathrop	1	6 x 6½	375	...	2	Optional
7	Mohawk	1	4½x 4½	900	...	..	J. S. M.
7	Mohawk	2	3½x 3¾	900	...	..	J. S. M.
7	Northwestern	1	5 x 6	600	...	..	J. S.
7	Ontario	1	5 x 5	450	300	3	J. S. or M.
7	Stanley	2	4 x 3½	600	346	2	J. S. or M.
7	Toledo	2	3½x 3½	750	190	..	J. S.
7½	Fay & Bowen	1	5½x 5½	500	580	2	M. B.
7½	Fulton	1	5½x 6	500	330	3	J. S.
7½	Knox	1	5½x 6¼	...	580	2-3	Optional
7½	Mianus	1	5⅛x 6	450	505	2	M. B. M.
7½	Palmer	1	6 x 6	400	375	2	J. S.
7½	Sagamore	1	5½x 5¾	475	300	..	M. B. or J. S.
7½	Stanley	1	5½x 6	425	450	2	M. B. M.

8 to 18 Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
8	American	1	5¼x 5	...	...	..	J. S.
8	American	2	3⅞x 3½	...	...	..	J. S.
8	Barber	2	4 x 4	600	...	3	J. S.
8	Barber	3	3¼x 3¼	750	...	3	J. S.
8	Barker	2	4⅛x 5	...	...	..	M. B.
8	Bridgeport	2	4½x 5	500	375	2-3	Optional
8	Essex	1	6 x 6	450	420	..	M. B.
8	Gardner, John R.	2	4 x 4	800	...	3	J. S. D.
8	Hartford	1	4½x 4¾	700	230	2	M. B.
8	Kahlenberg	1	.....	400	550	2	M. B. M.
8	Kahlenberg	2	.....	550	350	2	M. B. M.
8	L-A	2	4 x 4	700	...	2	J. S.
8	Lathrop	1	6½x 6½	350	...	2	Optional
8	Lathrop	2	4½x 5	550	...	2	Optional
8	Motorgo	2	4 x 4	800	275	2	J. S.
8	Roberts	1	6 x 6½	300	278	3	J. S. or M. B.
8	Roberts	2	3½x 4	1,000	162	3	J. S. D. or M.
8	Wisconsin	2	4 x 4	800	270	3	J. S. M.
9	Barber	1	5½x 5¼	550	...	3	J. S.
9	Bridgeport	1	6½x 6½	400	495	2-3	Optional
9	Guarantee	1	5½x 5	...	...	..	.....
9	Hubbard	2	4½x 5	525	459	2	M. B.
9	Kahlenberg	1	.....	375	650	2	M. B. M.
9	Knox	2	4½x 4½	...	420	2-3	Optional
9	Ontario	3	3½x 3½	900	270	3	J. S. or M.
9	Vim	1	5 x 5	700	285	3	J. S. D.
10	Barker	1	6½x 8	...	...	..	M. B.
10	Bridgeport	2	5¼x 5¼	500	470	2-3	Optional
10	Brown-Talbot	1	5½x 5	600	300	2	J. S.
10	Brown-Talbot	2	4 x 4	750	300	2	J. S.
10	Fay & Bowen	2	4½x 4½	550	510	2	M. B.
10	Fay & Bowen	1	6¼x 6¼	475	810	2	M. B.
10	Fulton	2	4½x 5	600	400	3	J. S.
10	Guarantee	2	4½x 4½	...	...	..	.....
10	Hartford	1	5 x 5¼	700	290	2	M. B.
10	Hubbard	1	7 x 7½	350	873	2	M. B.
10	Lathrop	1	7 x 7½	300	...	2	Optional
10	Lathrop	2	5⅛x 5	500	...	2	Optional
10	Mianus	1	6½x 7	375	775	2	M. B. M.
10	Mianus	2	4⅜x 5	500	590	2	M. B. M.
10	Mohawk	2	4½x 4½	500	...	..	J. S. M.

The Two-Cycle Motors of Nineteen-Eighteen

8 to 18 Horsepower Inclusive—(Continued)

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
10	Northwestern	2	4 x 4½	800	....	..	J. S.
10	Palmer	2	4½x 4½	650	325	3	J. S.
10	Sagamore	2	5⅛x 5	550	425	..	M. B. or J. S.
10	Stanley	2	5⅛x 4½	425	575	2	M. B. M.
10	Vim	2	4 x 4	700	270	3	J. S. D.
10	Watertown	2	3¼x 4¼	1,000	240	3	J. S.
11	Guarantee	1	6 x 5	....	....	..	.....
11	Hubbard	2	5 x 5½	450	531	2	M. B.
11	Knox	2	5 x 5¼	...	580	2-3	Optional
12	Aristox	3	3⅛x 3½	....	....	..	J. S. D. and M.
12	Barber	1	6½x 6½	500	....	3	J. S.
12	Barber	2	4¾x 4¾	600	....	3	J. S.
12	Barber	3	4 x 4	600	....	3	J. S.
12	Eagle	2	4½x 4	1,300	340	3	J. S. D.
12	Foreman	2	4¼x 4¼	800	355	3	J. S. D.
12	Gardner, John R.	2	4¾x 4	800	....	3	J. S. D.
12	Gardner, John R.	3	4 x 4	1,000	....	3	J. S. D.
12	Gardner, John R.	4	3½x 3½	1,500	....	3	J. S. D.
12	Kahlenberg	1	.....	350	750	2	M. B. M.
12	Kahlenberg	2	.....	400	400	2	M. B. M.
12	L-A	2	4½x 4½	700	....	2	J. S.
12	Lathrop	1	7½x 7½	275	....	2	Optional
12	Lathrop	2	5½x 5	500	....	2	Optional
12	Lathrop	2	5¼x 6½	400	....	2	Optional
12	Mianus	2	4¾x 5	700	562	2-3	J. S. M.
12	Mohawk	2	4¼x 3¼	1,200	....	..	J. S. M.
12	Mohawk	2	4½x 4½	700	....	..	J. S. M.
12	Ontario	4	3½x 3½	900	350	3	J. S. or M.
12	Palmer	2	5 x 6	625	425	3	J. S.
12	Sagamore	2	4⅞x 5	550	440	..	M. B. or J. S.
12	Toledo	2	4½x 4½	750	300	..	J. S.
12	Vim	2	5 x 5	450	510	3	J. S.
14	Bridgeport	2	5½x 6	450	700	2-3	Optional
14	Guarantee	1	7 x 7	....	....	..	.....
14	Guarantee	2	5 x 5	....	....	..	.....
14	Lathrop	2	6 x 6½	400	....	2	Optional
14	Ontario	2	5 x 5	600	500	3	J. S. or M.
14	Stanley	2	5¾x 4½	600	575	2	J. S. or M.
14	Wisconsin	2	4½x 4½	800	365	3	J. S. M.
15	Barber	2	5¼x 5½	....	....	..	M. B.
15	Brown-Talbot	1	7 x 6½	450	550	2	J. S.
15	Fay & Bowen	2	5½x 5½	500	900	2	M. B.
15	Foreman	2	5½x 6	500	450	3	J. S. D.
15	Fulton	2	5½x 6	500	525	3	J. S.
15	Hubbard	2	6 x 6½	425	816	2	M. B.
15	Kahlenberg	1	.....	325	900	2	M. B. M.
15	Knox	2	5½x 6¾	....	960	2-3	Optional
15	Mianus	2	5¼x 6	450	832	2	M. B. M.
15	Pierce-Budd	2	4 x 4	1,500	165	2-3	J. S. D.
15	Sagamore	2	5½x 5½	475	525	..	M. B. or J. S.
15	Smalley	2	4½x 4½	950	....	3	J. S.
15	Stanley	3	5½x 6	425	816	2	M. B. M.
15	Vim	3	4 x 4	700	340	3	J. S. D.
15	Vim	2	4 x 4	1,100	265	3	J. S. D. and M.
15	Watertown	3	3¾x 4¼	1,000	310	3	J. S.
16	Fulton	2	4½x 5	700	340	3	J. S. D.
16	Gardner, John R.	4	4 x 4	1,800	....	3	J. S. D.
16	Kahlenberg	2	.....	380	950	2	M. B. M.
16	Lathrop	2	6½x 6½	400	....	2	Optional
16	Mohawk	2	4½x 4½	900	....	..	J. S. M.
16	Roberts	4	3½x 4	1,000	310	3	J. S. D. or M.
18	Barber	2	5½x 5¼	550	....	3	J. S.
18	Barber	3	4¾x 4¾	600	....	3	J. S.
18	Bridgeport	2	6½x 7	400	900	2-3	Optional
18	Guarantee	2	5½x 5	....	....	..	.....
18	Mohawk	3	4½x 4½	700	....	..	J. S. M.
18	Northwestern	3	5 x 6	700	....	..	J. S.
18	Toledo	3	4½x 4½	750	420	..	J. S.
18	Vim	3	5 x 5	450	450	3	J. S. D.
18	Vim	3	5 x 5	450	689	3	J. S.
18	Wisconsin	3	4 x 4	950	420	3	J. S. M.

20 Horsepower and Over

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
20	American	2	5¼x 5	....	....	—	J. S.
20	Brown-Talbot	2	5½x 5	600	500	2	J. S.
20	Fay & Bowen	2	6½x 6½	475	1,260	2	M. B.
20	Hartford	2	5 x 5⅛	700	440	2	M. B.
20	Lathrop	2	7 x 7½	300	....	2	Optional
20	Mianus	2	6½x 7	375	1,275	2	M. B. M.
20	Watertown	4	3¼x 4¼	1,000	380	3	J. S.
21	Mohawk	3	4½x 3¼	1,200	....	..	J. S. or M.
21	Ontario	3	5 x 5	600	700	3	J. S. M.
22	Guarantee	2	6 x 5	....	....	..	.....
23	Vim	3	4 x 4	1,100	310	3	J. S. D. M.
24	Barber	2	6½x 6¾	500	....	3	J. S.
24	Gardner, John R.	4	4¾x 4	1,800	....	3	J. S. D.
24	Kahlenberg	2	.....	350	1,300	2	M. B. M.
24	Lathrop	2	7½x 7½	275	....	2	Optional
25	Hubbard	2	7 x 7½	350	1,600	2	M. B.
25	Pierce-Budd	3	4 x 4	1,800	240	2-3	J. S. D.
25	Vim	2	5 x 5	1,100	370	3	J. S. D. M.
25	Wisconsin	3	4½x 4½	1,000	465	3	J. S. M.
27	Barber	3	5½x 5¾	550	....	3	J. S.
27	Vim	3	5 x 5	700	614	3	J. S. D.
28	Ontario	4	5 x 5	600	900	3	J. S. or M.
30	Brown-Talbot	2	7 x 6¾	450	1,000	2	J. S.
30	Kahlenberg	2	.....	325	1,800	2	M. B. M.
30	Mohawk	3	4½x 4½	1,200	....	..	J. S. M.
35	Wisconsin	4	4½x 4½	1,000	580	3	J. S. M.
36	Barber	3	6½x 6¼	500	....	3	J. S.
36	Kahlenberg	2	.....	325	2,000	2	M. B. M.
36	Kahlenberg	3	.....	325	1,700	2	M. B. M.
36	Lathrop	3	7½x 7½	275	....	2	Optional
40	Barber	2	8 x 8	350	....	3	J. S.
40	Pierce-Budd	4	4 x 4	1,800	285	2-3	J. S. M.
45	Kahlenberg	3	.....	325	2,600	2	M. B. M.
50	Leighton	2	5 x 4½	1,000	350	3	J. S. M.
55	Kahlenberg	3	.....	325	2,800	2	M. B. M.
60	Barber	3	8 x 8	350	....	3	J. S.
60	Pierce-Budd	6	4 x 4	2,000	390	2-3	J. S. M.
60	Wisconsin	6	4½x 4½	1,200	900	3	J. S. M.
75	Leighton	6	5 x 4½	1,275	550	3	J. S. M.
85	Kahlenberg	3	.....	300	5,500	2	M. B. M.
100	Roberts	6	5 x 5½	1,350	392	3	J. S. M.
125	Roberts	6	5½x 6	1,350	450	3	J. S. M.
350	Roberts	6	6 x 6½	1,350	990	3	J. S. M.
400	Pierce-Budd	6	6½x 7	1,800	1,200	2	J. S. D.

Outboard Motors

Rated H.P.	Cycle	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Ports or Valves	Ignition
2	2	Evinrude	1	2½x 2½	750	80	2	J. S. M.
2	2	Motorgo	1	2¼x 2½	800	..	2	J. S. M.
2	2	Porto	1	2¼x 3	800	55	3	J. S. M.
3	2	Aerothrust	2	2½x 2¼	2,000	65	2	J. S. M.
3	2	Koban	2	2½x 2¾	900	..	2	J. S. M.
3½	2	Evinrude	1	3¼x 3	650	115	2	J. S. M.
4	2	Arrow	2	2¾x 2½	800	95	3	J. S. M.
4	4	Evinrdue	2	2¼x 2½	800	95	.	J. S. M.
5	2	Aerothrust	2	3 x 3½	1,500	85	2	J. S. M.

Diesel and Heavy Duty Oil Motors of 1918

Two-Cycle Motors

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
4	Remington	1	3⅛x 4	700	550	3	H. P.
7	Missouri	1	5 x 6	....	....	3	.....
7	Remington	1	5½x 6	500	800	3	H. P.
10	Remington	1	6¾x 6	500	875	3	H. P.
11	Remington	1	7 x 8	400	1,500	3	H. P.
14	Missouri	2	5 x 6	....	....	3	.....
14	Remington	2	5½x 6	500	1,050	3	H. P.
17	Remington	1	8½x 8	400	1,650	3	H. P.
22	Missouri	3	5 x 6	....	....	3	.....
22	Remington	2	6¾x 6	500	1,100	3	H. P.
23	Remington	3	5½x 6	500	1,600	3	H. P.
24	Remington	2	7 x 8	400	2,100	3	H. P.
25	Hatch	1	8 x10	450	....	..	H. R.
30	Fairbanks-Morse	2	8½x10	400	5,050	..	.....
30	Missouri	4	5 x 6	....	....	3	.....
32	Remington	4	5½x 6	500	1,750	..	H. P.
34	Remington	3	6¾x 6	500	1,850	3	H. P.
35	Remington	2	8¾x 8	400	2,300	3	H. P.
37	Remington	3	8¾x 8	400	3,400	3	H. P.
45	Fairbanks-Morse	3	8½x10	400	6,870	..	.....
46	Remington	4	6¾x 6	500	2,000	3	H. P.
50	Hatch	2	8 x10	450	....	..	H. R.
55	Kahlenberg	2	.....	300	4,000	2	.....
55	Remington	3	8¾x 8	400	4,000	3	H. P.
60	Fairbanks-Morse	4	8½x10	400	8,000	..	.....
60	Wisconsin Oil	2	6 x14	400	4,500	..	Diesel
70	Kahlenberg	..	.....	....	....	..	.....
75	Fairbanks-Morse	3	10½x12½	340	14,800	..	.....
75	Hatch	3	8 x10	450	....	..	H. R.
75	Remington	4	8¾x 8	400	6,000	3	H. P.
100	Fairbanks-Morse	4	10½x12½	340	17,600	..	.....
100	Hatch	2	12 x14	375	....	..	H. R.
100	Hatch	4	8 x10	450	....	..	H. R.
100	Kahlenberg	..	.....	....	....	..	.....
120	Wisconsin Oil	2	8 x22	350	8,500	..	Diesel
130	Kahlenberg	..	.....	....	....	..	.....

Two-Cycle Motors (Continued)

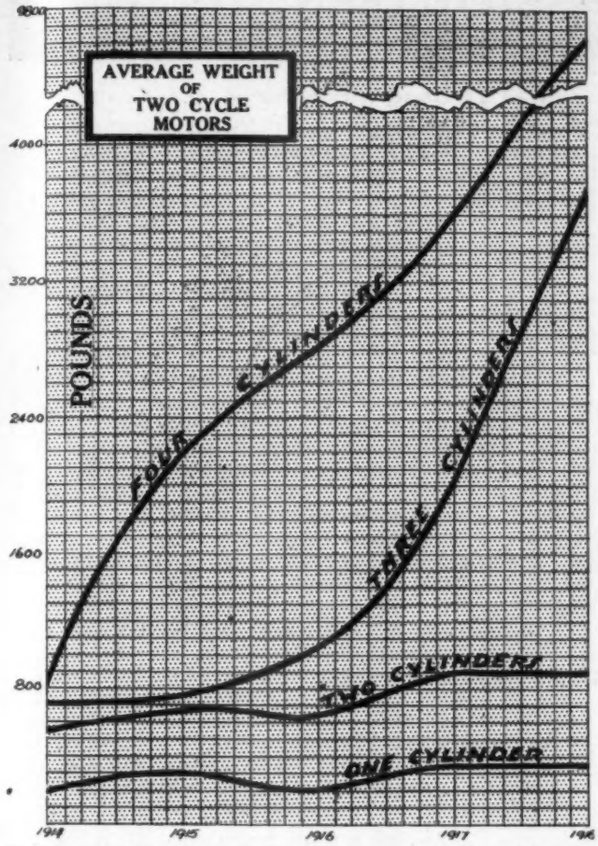
Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
150	Fairbanks-Morse	3	14 x18	250	20,000	..	.....
150	Hatch	3	12 x14	375	....	..	H. R.
200	Fairbanks-Morse	4	14 x18	250	25,000	..	.....
200	Hatch	4	12 x14	375	....	..	H. R.
200	Remington	4	15 x15	240	50,000	3	H. P.
200	Wisconsin Oil	3	8 x22	350	13,000	..	Diesel
280	Wisconsin Oil	4	8 x22	350	17,000	..	Diesel
300	Remington	6	15 x15	240	75,000	3	H. P.

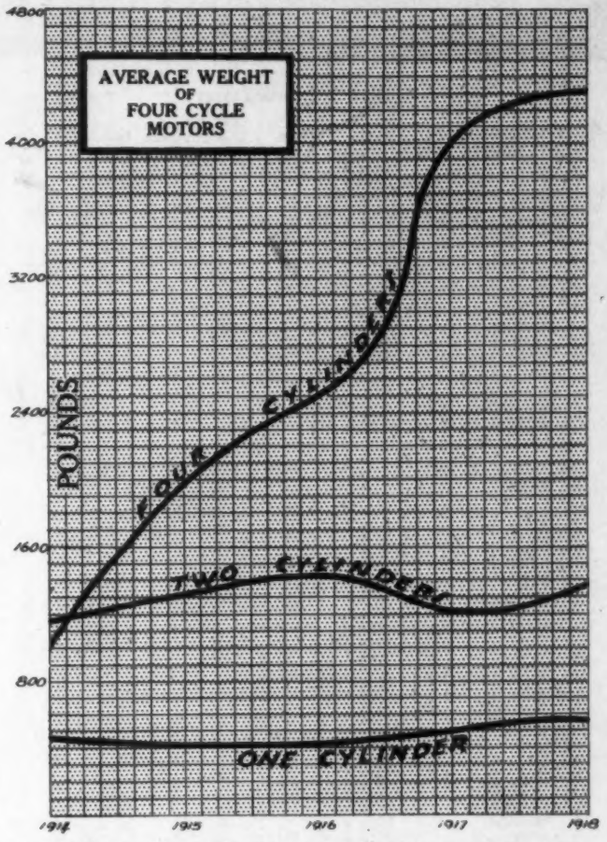
Four-Cycle Motors

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Port	Ignition
25	Standard Oil	2	7½x10	375	3,300	..	Semi-Diesel
38	Standard Oil	3	7½x10	375	4,650	..	Semi-Diesel
40	Standard Oil	2	9 x12	330	5,300	..	Semi-Diesel
50	Fulton	3	8 x 9	400	8,000	L	Diesel
50	Standard Oil	4	7½x10	375	5,850	..	Semi-Diesel
60	Standard Oil	3	9 x12	330	6,700	..	Semi-Diesel
70	Fulton	4	8 x 9	400	10,000	L	Diesel
75	Standard Oil	2	10 x14	275	15,500	..	Semi-Diesel
80	Standard Oil	4	9 x12	330	8,100	..	Semi-Diesel
100	Fulton	6	8 x 9	400	10,500	L	Diesel
100	Standard Oil	3	10 x14	275	18,500	..	Semi-Diesel
120	Nlseco	4	9 x12½	350	16,500	H	Diesel
150	Standard Oil	4	10 x14	275	24,000	..	Semi-Diesel
180	Nlseco	6	9 x12½	350	21,500	H	Diesel
240	Nlseco	8	9 x12½	350	34,000	H	Diesel
240	Nlseco	4	13 x18	240	45,000	H	Diesel
360	Nlseco	6	13 x18	240	55,000	H	Diesel
480	Nlseco	8	13 x18	240	65,000	H	Diesel
600	Nlseco	6	18 x27	170	140,000	H	Diesel
800	Nlseco	8	18 x27	170	185,000	H	Diesel
800	Nlseco	4	18 x27	170	200,000	H	Diesel
1200	Nlseco	6	18 x27	170	300,000	H	Diesel
1600	Nlseco	8	18 x27	170	400,000	H	Diesel

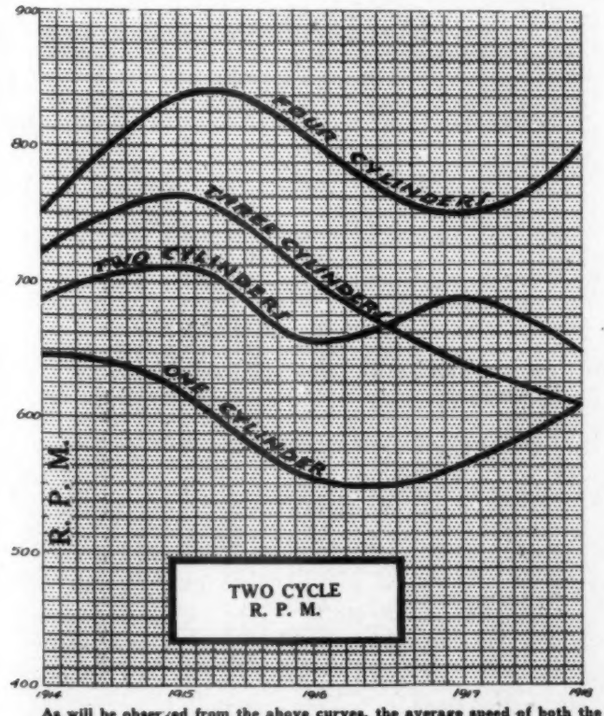
The Answer of the Slide Rule

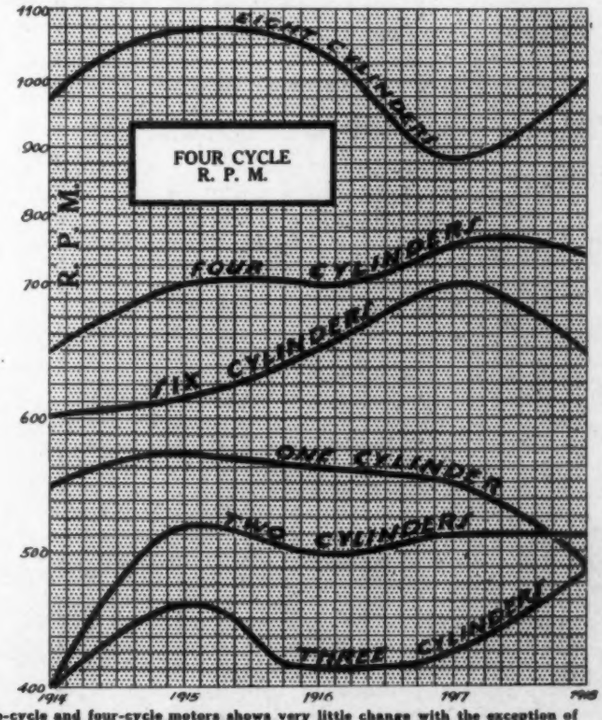
A word as to how the curves showing the trend of motor design are obtained may be of interest to our readers. In every case they represent the average of all models on the market of the type under consideration. Thus, the average weight of the four-cylinder, two-cycle motor includes gasoline, kerosene and the heavy-oil motors. The first step is to add up the weights of all motors of this model and then divide by the number of models, thus obtaining the average weight. This process of averaging up the characteristics of the various types of motors is gone through every year, a new point plotted according to the new data obtained and the curve extended from the previous year.





The average weight of the marine motor shows very little change during the last year with the exception of the three- and four-cylinder, two-cycle engines. These show the effect of the increase in popularity of the Diesel and heavy-oil engines





As will be observed from the above curves, the average speed of both the two-cycle and four-cycle motors shows very little change with the exception of the eight-cylinder group. Here the increase in boat speed is clearly shown by a decided increase in engine speed

THE FOUR-CYCLE MOTORS OF NINETEEN EIGHTEEN

Under 7 Horsepower

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
1½	Nieland	1	3 x 3½	800	95	L	M. B.
2	Dunn	1	3½ x 4	500	100	..	J. S. D.
2	Nieland	1	3½ x 4	700	115	L	M. B.
2	Regal	1	3½ x 3½	800	125	L	J. S. M.
2	Strang	1	3 x 4½	1,000	360	L	J. S. M.
2½	Anderson	1	4 x 4	600	250	T	J. S. D.
2½	Matthews	1	3 x 3	1,200	235	H	J. S. M.
2½	Nieland	1	4 x 4½	475	275	L	M. B. M.
3	Alexander & Cox	1	4 x 5	600	...	L	J. S. M.
3	Automatic	1	4¼ x 5	500	300	L	Optional
3	Strang	1	3½ x 5	900	390	L	J. S. M.
3¼	Evansville	1	4½ x 5	500	290	H	J. S. D. or M.
4	Anderson	1	4½ x 5	550	375	T	J. S. D.
4	Buffalo	2	3 x 4	700	240	L	J. S. D. & M.
4	Carl	1	4½ x 5	400	...	T	J. S. D. or M.
4	Clay	1	4½ x 5	500	385	H	J. S. D. or M.
4	Dunn	2	3¾ x 4	600	215	..	J. S. D.
4	Frisco Standard	1	4¾ x 6	420	615	H	M. B. M.
4	Grizzly Bear	1	4½ x 5½	450	400	L	J. S. D.
4	Guarantee	1	4½ x 4½	...	....	..	.....
4	Miller	1	4½ x 5	600	400	L	J. S. M.
4	Missouri	1	4¼ x 5	...	...	L	J. S. D.
4	Murray & Tregurtha	2	3½ x 4	550	400	L	M. B. M.
4	Nieland	1	5 x 6	350	550	L	M. B. M.
4	Regal	1	4 x 4½	800	250	L	J. S. M.
4	Strang	1	4 x 5	900	480	L	J. S. M.
4	Vulcan	1	4¾ x 6	500	550	T	Optional
5	Anderson	2	4 x 4	600	350	T	J. S. D.
5	Carl	1	5 x 6	450	...	T	J. S. D. M.
5	Evansville	1	5 x 6	500	400	H	J. S. D. or M.
5	Frisbie	1	4¾ x 5	600	325	H	J. S.
5	Frisco Standard	1	5¾ x 6½	400	850	H	M. B. M.
5	Lisk	1	4¾ x 5	400	200	L	J. S.
5	Matthews	2	3 x 3	1,200	275	H	J. S. M.
5	Nieland	2	4 x 5	475	500	L	M. B. M.
5	Palmer	1	4½ x 6	600	375	T	J. S. D.
5	Regal	1	4½ x 5½	650	335	L	J. S. M.
5	Vulcan	1	5¼ x 7	500	700	T	Optional
5	Wolverine	1	5½ x 6	500	495	L	J. S. D. M.
6	Alexander & Cox	2	4 x 5	600	..	L	J. S. M.
6	Anderson	1	5 x 6½	500	600	T	J. S. D.
6	Automatic	1	5½ x 7	400	643	L	Optional
6	Automatic	2	4¼ x 5	500	525	L	Optional
6	Buffalo	2	3½ x 5	600	400	L	J. S. D. M.
6	Carl	1	6 x 8	350	...	T	J. S. D. M.
6	Clay	1	5½ x 7	400	675	H	J. S. D. or M.
6	Dunn	3	3¾ x 4	600	250	..	J. S. D.
6	Fisherman	1	5 x 6	600	550	H	J. S.
6	Hall	1	5 x 6½	600	600	L	Optional
6	Harris	1	5½ x 6¼	450	400	..	M. B. or J. S.
6	Hettinger	1	5½ x 6	...	500	L	M. B. or J. S. D.
6	Miller	1	5¼ x 6	580	500	L	J. S. M.
6	Murray & Tregurtha	2	5 x 6	550	600	L	M. B. M.
6	Nieland	1	6 x 7½	350	700	L	M. B. M.
6	Palmer	1	5 x 6	600	400	T	J. S. D. & M.
6	Peerless	1	5 x 6	600	350	..	J. S.
6	Strang	1	4½ x 6	850	698	L	J. S. M.
6½	Palmer	1	5½ x 6½	600	425	T	J. S. M.

7 to 11 Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
7	Acme	1	6¼ x 7½	360	1,170	H	Optional
7	Doman	1	5 x 6	600	500	T	J. S. D.
7	Frisbie	1	6 x 6	500	500	H	J. S.
7	Frisco Standard	1	6¼ x 7	380	1,130	H	M. B. M.
7	Guarantee	1	6 x 5	....	....	..	.....
7	Regal	1	5¼ x 6½	550	180	L	M. B. or J. S.
7½	Evansville	2	4½ x 5	500	390	H	J. S. D. or M.
7½	Vulcan	1	6½ x 7¼	450	975	T	Optional
8	Anderson	2	4½ x 5	550	550	T	J. S. D.
8	Carl	2	4½ x 5	500	...	T	J. S. M. or D.
8	Clay	1	6½ x 7	400	825	H	J. S. D. or M.
8	Clay	2	4½ x 5	500	575	H	J. S. D. or M.
8	Dunn	2	4½ x 5	700	300	..	J. S. D.
8	Evansville	1	6 x 6¼	500	650	H	J. S. D. or M.
8	Frisco Standard	2	4¾ x 6	440	1,000	H	M. B. M.
8	Grizzly Bear	2	4½ x 5½	450	750	L	J. S. D.
8	Guarantee	1	6 x 7	...	....	..	.....
8	Guarantee	2	4½ x 4½	....	....	..	.....
8	Harris	1	6 x 7	450	475	..	M. B. or J. S.
8	Hunter	4	2¾ x 3½	800	250	L	J. S. D. M.
8	Missouri	2	4¼ x 5	....	....	L	J. S. D.
8	Niagara	2	3½ x 4½	800	415	T	J. S. D. or M.
8	Nieland	1	6½ x 8	325	800	L	M. B. M.
8	Nieland	2	5 x 6	375	775	L	M. B. M.
8	Philadelphia	1	6 x 8	375	800	L	M. B. M.
8	Ralaco	2	4 x 6	600	860	H	J. S.
8	Regal	2	4 x 4½	800	450	L	J. S. M.
8	Standard Oil	1	6 x 7½	475	600	L	M. B. or J. S.
8	Strang	1	5½ x 6	850	750	L	J. S. M.
8	Vulcan	2	4½ x 6	550	975	T	Optional
8	Wood & Chute	1	6 x 7	400	....	..	J. S. M.
9	Acme	1	7½ x 9	340	1,850	H	Optional
9	Automatic	3	4¼ x 5	500	760	L	Optional
9	Hettinger	2	4½ x 6	...	640	L	J. S.
9	Regal	1	6½ x 7	500	1,040	L	M. B. or J. S.
10	Clay	1	7½ x 7½	400	950	H	J. S. D. or M.
10	Dice	2	5 x 5	750	....	L	J. S. M.
10	Evansville	2	5 x 6	500	525	H	J. S. D. or M.
10	Frisbie	2	4¾ x 5	600	430	H	J. S. D. or M.
10	Frisco Standard	2	5½ x 6	400	1,320	H	M. B. M.
10	Guarantee	1	7 x 7	...	....	..	.....

7 to 11 Horsepower Inclusive—(Continued)

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
10	Harris	2	5 x 5½	500	550	..	M. B. or J. S.
10	Hunter	4	3½ x 4	800	300	L	J. S. D. M.
10	Miller	2	4½ x 6	600	600	L	J. S. M.
10	Niagara	2	4½ x 5½	800	525	T	J. S. D. or M.
10	Nieland	2	6 x 7	325	1,180	L	M. B. M.
10	Peerless	2	4 x 6	800	450	T	J. S. M.
10	Red Wing	2	4½ x 5	600	425	T	J. S. M.
10	Regal	2	4½ x 5½	650	685	L	J. S. M.
10	Reliable	2	5 x 5	600	...	H	.....
10	Sterling	4	2¾ x 4½	1,000	250	L	J. S. M.
10	Strang	1	6½ x 7	650	800	L	J. S. M.
10	Vulcan	2	5¼ x 7	500	1,100	T	Optional
11	Murray & Tregurtha	2	5 x 6	500	700	L	M. B. M.
11	Palmer	2	4½ x 6	600	650	T	J. S. D. M.
11	Vulcan	1	7½ x 8½	400	1,200	T	Optional

12 to 15 Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
12	Able	4	2¾ x 4	1,200	180	T	J. S. M.
12	Alexander & Cox	4	4 x 5	600	...	L	J. S. M.
12	Anderson	2	5 x 6	500	850	T	J. S. M.
12	Automatic	2	5½ x 7	400	1,115	L	Optional
12	Buffalo	2	5 x 6½	400	1,170	L	J. S. D. M.
12	Carl	2	5 x 6	490	....	T	J. S. D. M.
12	Carson	4	2½ x 4	1,200	300	L	J. S. D. or M.
12	Dice	2	5½ x 5	750	...	L	J. S. M.
12	Dunn	3	4¼ x 5	750	375	..	J. S. D.
12	Fisherman	2	5 x 6	600	850	H	J. S.
12	Frisco Standard	2	6 x 7	380	1,690	H	M. B. M.
12	Gray	2	3½ x 4½	1,100	385	L	J. S. M.
12	Grizzly Bear	3	4½ x 5½	450	1,000	L	J. S. D.
12	Harris	2	5½ x 6½	450	800	..	M. B. or J. S.
12	Hettinger	2	5½ x 6	....	785	L	M. B. J. S.
12	Kermath	4	3¾ x 4	1,000	525	L	J. S. M.
12	Lathrop	2	5¾ x 6½	450	...	T	J. S. D. M.
12	Lisk	2	4¾ x 5	400	450	L	J. S.
12	Missouri	2	5 x 6	...	...	L	J. S. D. or M.
12	Murray & Tregurtha	4	4½ x 5	550	900	L	M. B. M.
12	Nieland	2	6½ x 8	300	1,400	L	M. B. M.
12	Palmer	2	5 x 6	600	750	T	J. S. D. M.
12	Peerless	2	5 x 6	600	500	L	J. S.
12	Philadelphia	2	4¾ x 5½	500	500	L	J. S. M.
12	Standard	2	5 x 6½	450	850	H & S	M. B. M.
12	Universal	4	2¾ x 4	...	350	L	J. S. D. or M.
12	Wolverine	2	5½ x 7	500	1,136	L	J. S. D. M.
13	Scripps	2	4½ x 5	800	650	L	J. S. M.
14	Arihtocrat	4	3½ x 4	950	660	..	J. S. M.
14	Carl	2	6 x 8	320	...	T	J. S. D. M.
14	Clay	2	5½ x 7	400	1,300	H	J. S. D. or M.
14	Clifton	2	6½ x 7	480	1,250	L	J. S. M.
14	Doman	2	5 x 6	800	725	T	J. S. M.
14	Guarantee	2	6 x 5	....	....	..	.....
14	Guarantee	4	3¼ x 4	....	....	..	.....
14	L-A	4	3¾ x 4½	700	....	..	J. S.
14	Miller	2	5¼ x 6½	500	800	L	J. S. M.
14	Motorgo	4	3¾ x 4½	800	600	L	J. S. M.
14	Murray & Tregurtha	2	5½ x 7	425	1,200	L	J. S. M.
14	Niagara	4	4¾ x 5½	900	625	T	J. S. M.
14	Red Wing	2	5 x 6	600	550	T	J. S. M.
14	Regal	2	5¼ x 6½	550	950	L	M. B. or J. S.
14	Wolverine	2	6½ x 7	400	1,545	L	J. S. D. M.
15	Acme	2	6¼ x 7½	360	1,950	H	Optional
15	Buffalo	2	6 x 7½	350	1,400	L	J. S. D. M.;
15	Evansville	3	5 x 6	500	700	H	J. S. D. or M.
15	Evansville	4	4½ x 5	500	625	H	J. S. D. or M.
15	Gray	4	3 x 4	2,000	440	L	J. S. M.
15	Hall	2	5½ x 6¼	600	1,000	L	Optional
15	Niagara	4	3½ x 4½	900	560	T	J. S. D. or M.
15	Nieland	3	6 x 7	325	1,500	T	M. B. M.
15	Palmer	3	4½ x 6	600	900	T	J. S. D. M.
15	Ralaco	2	5 x 7	500	1,300	H	J. S.
15	Scripps	2	4½ x 5	900	500	L	J. S. M.
15	Sterling	2	5½ x 7	500	1,065	L	J. S. M.
15	Strang	2	5½ x 7	1,100	650	L	J. S. M.
15	Vulcan	2	6½ x 7½	475	1,770	T	Optional

16 to 20 Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
16	Bridgeport	2	6½ x 7½	400	1,200	L	J. S. M.
16	Carl	4	4½ x 5	800	....	T	J. S. D. M.
16	Dunn	4	4¾ x 5	800	475	..	J. S. D.
16	Evansville	2	6 x 6¾	500	750	H	J. S. D. or M.
16	Frisbie	2	6 x 6	550	700	H	J. S. D. or M.
16	Frisco Standard	2	6¼ x 7½	360	1,785	H	M. B. M.
16	Guarantee	2	6 x 7	....	....	..	.....
16	Harris	2	6 x 7	450	1,060	..	M. B. or J. S.
16	Kermath	4	3¾ x 4	1,000	525	L	J. S. M.
16	Lathrop	2	5¾ x 6½	450	....	T	J. S. D. or M.
16	Mianus	2	6 x 8	400	1,600	T	M. B. or J. S. M.
16	Philadelphia	2	6 x 8	375	1,800	L	M. B.
16	Regal	4	4 x 4	800	650	L	J. S. M.
16	Reliable	2	6 x 6	550	...	H	J. S. M.
16	Standard Oil	2	6 x 7	475	1,100	L	M. B. or J. S.
16	Vulcan	4	4½ x 6	550	1,050	T	Optional
16	Wood & Chute	2	6 x 7	400	....	..	J. S. M.
17	Fay & Bowen	4	3¼ x 4½	1,400	450	..	J. S. D. M.
18	Anderson	3	5 x 6	500	1,100	T	J. S. M.
18	Automatic	3	5½ x 7	400	1,425	L	Optional
18	Clay	2	6½ x 7	400	1,525	H	J. S. D. or M.
18	Doman	4	4 x 5	800	800	T	J. S. M.
18	Frisbie	3	4¾ x 5	700	650	H	J. S. D. or M.

The Four-Cycle Motors of Nineteen-Eighteen

16 to 20 Horsepower Inclusive—(Continued)

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
18	Gaeth	2	5½x 8	600	1,000	..	M. B. or J. S. M.
18	Gray-Prior	2	4½x 8	600	1,300	L	J. S. D. M.
18	Hettinger	2	6½x 8	...	1,600	L	J. S. D.
18	Lisk	3	4¾x 5	500	525	L	J. S. D.
18	Missouri	4	4¾x 5	...	...	L	J. S. D. or M.
18	Murray & Tregurtha	2	6½x 8	425	1,600	L	M. B. M.
18	Palmer	2	6¾x 8	400	1,600	T	J. S. D. M.
18	Palmer	3	5 x 6	600	1,000	T	J. S. D. M.
18	Regal	2	6½x 7	500	1,560	L	M. B. or J. S.
18	Standard	2	6 x 8	400	1,200	H & S	M. B. M.
18	Wisc. Consistent	4	3¾x 5	1,000	430	L	J. S. M.
20	Acme	2	7¼x 9	340	2,925	H	Optional
20	Brennan	4	4 x 5	900	650	L	J. S. M.
20	Buffalo	4	3¾x 5	800	710	L	J. S. D. M.
20	Doman	2	6 x 8	500	1,450	T	J. S. M.
20	Evansville	4	5 x 6	500	875	H	J. S. D. or M.
20	Frisco Standard	2	7¼x 9	320	2,885	H	M. B. M.
20	Grizzly Bear	3	5¾x 7	400	2,500	H	J. S. D.
20	Guarantee	2	7 x 7	...	...	..	.....
20	Hall	2	5½x 8½	500	1,400	L	Optional
20	Miller	4	3½x 5	1,000	600	L	J. S. M.
20	Morton	4	3½x 4	1,000	450	H	J. S. M.
20	Nieland	2	7½x 9	275	2,000	L	M. B. M.
20	Nieland	3	6½x 7¼	300	1,800	L	M. B.
20	Palmer	4	4½x 6	600	1,150	T	J. S. D. M.
20	Peerless	4	4 x 6	1,000	675	L	J. S. M.
20	Ralaco	4	4 x 6	600	1,375	H	J. S.
20	Red Wing	4	4½x 5	600	800	T	J. S. M.
20	Red Wing Thbd.	4	3½x 4½	700	540	L	J. S. M.
20	Regal	4	4½x 5½	650	900	L	J. S. M.
20	Reliable	2	6 x 6	600	...	H	J. S. M.
20	Scripps	4	3½x 4	1,200	430	H	J. S. M.
20	Sterling	4	4¾x 5½	600	760	T	J. S. M.
20	Strang	2	6½x 7	1,250	650	L	J. S. M.
20	20th Century	2	6½x 8½	450	2,000	S	J. S. M.
20	Vulcan	4	5¼x 7	500	1,400	T	Optional
20	Wolverine	2	5½x 7	800	1,136	L	J. S. D. M.

21 to 27 Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
21	Clifton	3	6½x 7	400	2,000	L	J. S. M.
21	Lathrop	3	5½x 6½	500	...	T	J. S. D. or M.
22	Buffalo	2	7 x 9	350	2,100	L	J. S. D. M.
22	Clay	2	7½x 7½	400	1,750	H	J. S. D. or M.
22	Fay & Bowen	4	3½x 5	1,200	525	..	J. S. D. M.
22	Harris	2	6½x 8½	375	1,650	..	M. B. or J. S.
22	Miller	4	4½x 6	800	1,000	L	J. S. M.
22	Vulcan	2	7½x 8½	425	2,400	T	Optional
22	Wisc. Consistent	4	3¾x 5	1,000	505	L	J. S. M.
22	Wolverine	3	6½x 7	400	2,285	L	J. S. D. M.
23	Speedway	4	4 x 4½	1,200	495	L	J. S. M.
24	Anderson	4	5 x 6	500	1,350	T	J. S. M.
24	Automatic	4	5½x 7	400	1,800	L	Optional
24	Buffalo	4	5 x 6½	400	1,960	L	J. S. D. M.
24	Bridgeport	2	7½x 9	375	2,000	L	J. S. M.
24	Bridgeport	3	6½x 7½	400	1,600	L	J. S. M.
24	Dunn	6	4¼x 5	800	625	..	J. S. D.
24	Evansville	3	6 x 6½	500	1,265	H	J. S. D. or M.
24	Gray	4	3¾x 4½	1,500	440	L	J. S. M.
24	Harris	3	6 x 7	500	1,100	..	M. B. or J. S.
24	Mianus	3	6 x 8	400	2,200	T	J. S. M. B.
24	Missouri	4	5 x 6	...	...	L	J. S. D. or M.
24	Murray & Tregurtha	4	5 x 6	650	1,000	L	M. B. M.
24	Palmer	4	5 x 6	600	1,250	L	J. S. D. or M.
24	Peerless	2	5¾x 7	700	1,200	T	J. S. M.
24	Red Wing Thbd.	4	3¾x 4½	700	560	L	J. S. M.
24	Standard	4	5 x 6½	450	1,600	H & S	M. B. M.
24	Standard Oil	3	6 x 7½	475	1,400	L	M. B. or J. S.
24	Wisc. Consistent	4	4 x 5	1,000	515	L	J. S. M.
24	Wood & Chute	3	6 x 7	400	...	..	J. S. M.
25	Acme	3	6¼x 7½	400	2,750	H	Optional
25	Anderson	2	7 x 8½	450	1,200	T	J. S. M.
25	Automatic	2	7½x 9	350	2,625	L	Optional
25	Capitol	4	4¾x 5½	1,000	525	L	J. S. M.
25	Frisbie	3	6 x 6	550	1,050	H	J. S. D. or M.
25	Frisco Standard	3	6¾x 7	450	2,310	H	M. B. M.
25	Guarantee	4	4½x 5½	...	...	..	J. S. M.
25	Harris	4	5½x 6½	500	1,500	..	M. B. or J. S.
25	Hettinger	2	7½x 9	...	2,500	L	J. S. D.
25	Kermath	4	4 x 4	1,000	550	L	J. S. M.
25	Knox	2	7 x 8	...	1,900	T	J. S. M.
25	Niagara	4	4½x 5½	900	900	T	J. S. D. or M.
25	Palmer	2	7½x10	400	3,000	T	J. S. D. M.
25	Ralaco	2	7 x 9	400	3,300	H	M. B.
25	Reliable	2	7 x 7	450	...	H	J. S. M.
25	Standard	4	4 x 5	900	500	H & S	M. B. M.
25	Standard Oil	2	7½x10	400	3,100	L	M. B. or J. S.
25	Sterling	4	3¾x 5½	1,000	575	L	J. S. M.
25	Vulcan	3	6½x 7¾	475	1,800	T	Optional
26	Lisk	4	4¾x 5	600	700	L	J. S. D. or M.
26	Palmer	3	6¾x 8	400	2,000	T	J. S. D. M.
27	Acme	2	8¼x10	320	3,975	H	Optional
27	Gaeth	3	5½x 8	600	1,500	..	M. B. & J. S. M.
27	Scripps	4	4½x 5	800	910	L	J. S. M.
27	Standard	3	6 x 8	400	1,800	H & S	M. B. M.

28 to 35 Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
28	Able (V)	8	2½x 4	1,200	280	..	J. S. M.
28	Carl	4	5 x 6	750	...	T	J. S. D. M.
28	Clay	2	7½x 9	375	2,650	H	J. S. D. or M.
28	Clifton	4	6½x 7	400	2,600	L	J. S. M.
28	Doman	2	7 x 9	500	1,850	T	J. S. M.
28	Fay & Bowen	4	4 x 5½	1,000	800	..	J. S. D. M.
28	Lathrop	4	5½x 6½	500	...	T	J. S. D. or M.
28	Murray & Tregurtha	3	6½x 8	400	1,900	L	M. B. M.
28	Red Wing	4	5 x 6	600	1,000	T	J. S. M.
30	Automatic	4	5 x 7	550	1,800	L	J. S.
30	Brennan	4	4 x 5	1,200	600	L	J. S. M.
30	Buffalo	4	4¾x 5	800	929	L	J. S. D. M.
30	Buffalo	4	6 x 7½	350	2,100	L	J. S. D. M.
30	Doak	2	8 x10	350	4,900	H	J. S. M.

28 to 35 Horsepower Inclusive—(Continued)

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
30	Doman	4	5 x 6	800	1,100	T	J. S. M.
30	Frisbie	4	4¾x 5	800	725	H	J. S. D. or M.
30	Frisco Standard	3	6½x 8	360	3,285	H	M. B. M.
30	Frisco Standard	2	8¾x10½	300	4,190	H	M. B. M.
30	Lathrop	3	5½x 6½	700	...	T	Optional
30	Miller	4	5¼x 6	700	1,300	L	J. S. M.
30	Murray & Tregurtha	4	5½x 7	425	2,200	L	M. B. M.
30	Nieland	3	7½x 9	275	2,800	T	M. B. M.
30	Ralaco	4	5 x 7	500	2,200	H	J. S.
30	Regal	4	5¾x 6½	600	1,425	L	M. B. or J. S.
30	Strang	3	6½x 7	1,800	650	L	J. S. M.
30	Vulcan	4	6½x 7¾	475	2,250	T	Optional
30	Wisc. Consistent	4	4¼x 5	1,000	540	T	J. S. M.
32	Bridgeport	4	6½x 7½	400	2,000	L	M. B. or J. S.
32	Evansville	4	6 x 6½	500	1,425	H	J. S. D. or M.
32	Hall	4	5½x 6¼	600	1,800	L	Optional
32	Harris	2	8 x10	350	2,500	..	M. B. or J. S.
32	Mianus	4	6 x 8	400	2,750	T	J. S. M. B. M.
32	Reliable	2	7¾x 8	450	...	H	J. S. M.
32	Standard Oil	4	6 x 7½	475	1,700	L	M. B. or J. S.
32	Wolverine	3	7¼x 9	350	3,914	L	J. S. D. M.
32	Wood & Chute	4	6 x 7	400	...	..	J. S. M.
34	Capitol	4	4¼x 5½	1,000	575	L	J. S. M.
35	Acme	3	7¼x 9	350	4,275	H	Optional
35	Acme	4	6¼x 7½	425	3,475	H	Optional
35	Brennan	4	4½x 5	800	750	L	J. S. M.
35	Clay	2	8½x 9	375	2,800	H	J. S. D. or M.
35	Fay & Bowen	4	4½x 5½	1,000	885	..	J. S. D. M.
35	Guarantee	4	5 x 5½	...	...	..	.....
35	Miller	4	5¼x 7½	550	1,600	L	J. S. M.
35	Palmer	3	7½x10	400	3,500	T	J. S. D. M.
35	Palmer	4	6¼x 8	400	2,400	T	J. S. D. M.
35	Peerless	4	5 x 6	1,000	750	L	J. S. M.
35	Sterling	4	4¾x 5½	1,000	620	T	J. S. M.
35	Vulcan	3	7½x 8½	425	3,000	T	Optional

36 to 50 Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
36	Bridgeport	3	7½x 9	375	3,200	L	J. S. M.
36	Gaeth	4	5½x 8	600	1,800	..	M. B. & J. S. M.
36	Gray-Prior	4	4½x 8	600	1,800	L	J. S. D.M.
36	Hettinger	4	6½x 8	...	3,100	L	J. S. D.
36	Missouri	6	5 x 6	...	...	L	J. S. D. or M
36	Red Wing Thbd.	4	4¼x 5	1,000	635	L	J. S.M.
36	Red Wing	4	6 x 6½	600	1,300	T	J. S. M.
36	Regal	4	6½x 7	500	2,500	L	M. B. or J. S.
36	Scripps	4	4½x 5	1,400	725	L	J. S. M.
37	Anderson	3	7 x 8¼	450	1,700	T	J. S. M.
37	Automatic	3	7½x 9	350	3,465	L	Optional
37	Standard	4	6 x 8	400	2,800	H & S	M. B. M.
38	Carl	4	6 x 8	425	...	T	J. S. D. M.
38	Standard Oil	3	7½x10	375	4,300	L	M. B. or J. S.
40	Automatic	4	5½x 7	550	1,850	L	J. S.
40	Brennan	4	4½x 5	1,400	700	L	J. S. M.
40	Brennan	4	5 x 5	900	850	L	J. S. M.
40	Doak	3	7¼x 9	375	5,600	H	J. S. M.
40	Doman	4	6 x 6	800	1,500	T	J. S. M.
40	Doman	4	6 x 8	500	2,275	T	J. S. M.
40	Doman	6	5 x 6	800	1,500	T	J. S. M.
40	Frisbie	4	6 x 6	650	1,200	H	J. S. D. or M.
40	Frisco Standard	3	8 x10	320	4,875	H	M. B. M.
40	Hall	2	8 x12	400	4,000	L	Optional
40	Hall	4	5½x 8½	500	2,400	L	Optional
40	Lathrop	4	5½x 6½	700	...	T	J. S. D. or M.
40	Lisk	6	4¾x 5	600	900	L	J. S. D. or M.
40	Lisk	4	6 x 7	500	1,200	T	J. S. D. or M.
40	Missouri	4	7 x 8	...	...	L	J. S. D. or M.
40	Murray & Tregurtha	4	6½x 8	400	2,500	L	M. B. M.
40	Red Wing Thbd.	4	4½x 5	1,000	680	L	J. S. M.
40	Reliable	2	9 x10	350	...	H	J. S. M.
40	Speedway	4	4½x 5½	1,200	850	L	J. S. M.
40	Standard Oil	2	9 x12	330	4,900	L	M. B. or J. S.
40	Strang	4	6½x 7	2,500	650	L	J. S. M.
40	Vulcan	6	5¼x 7	550	1,900	T	Optional
40	Wisc. Consistent	4	4¾x 5½	1,000	690	T	J. S. M.
40	Wolverine	4	5½x 7	800	1,648	L	J. S. D.
42	Wisc. Consistent	6	4¼x 5	1,000	700	T	J. S. M.
42	Wolverine	3	8½x 9	350	4,130	L	J. S. D. M.
45	Acme	3	8¼x10	325	6,280	H	Optional
45	Automatic	6	5 x 7	550	2,500	L	J. S.
45	Buffalo	4	7 x 9	350	3,655	L	J. S. D. M.
45	Capitol	4	3¾x 5½	2,000	525	L	J. S. M.
45	Capitol	4	4¾x 5½	2,000	575	L	J. S. M.
45	Doak	3	8 x10	350	5,500	H	J. S. M.
45	Fay & Bowen	4	5 x 6¼	1,000	1,095	..	J. S. D. M.
45	Harris	3	7½x 9½	375	3,350	..	M. B. or J. S.
45	Niagara	4	4¾x 5½	900	945	T	J. S. D. or M.
45	Ralaco	6	5 x 7	500	2,700	H	J. S.
45	Scripps	6	4½x 5	900	1,200	L	J. S. M.
45	Sterling	4	6½x 9	400	2,850	H & S	J. S. D. M.
45	Vulcan	4	7½x 8½	425	3,600	T	Optional
45	Wisc. Consistent	4	5 1/10x 5½	1,000	700	T	J. S. M.
48	Bridgeport	4	7½x 9	375	4,500	L	J. S. M.
48	Gaeth	4	5½x 8	800	1,800	..	M. B. & J.S.M.
50	Acme	4	7¼x 9	400	5,860	H	Optional
50	Anderson	2	9¼x11	400	3,500	T	J. S. M.
50	Anderson	4	7 x 8½	450	2,200	T	J. S. M.
50	Automatic	4	6½x 8	500	3,000	L	J. S.
50	Automatic	4	7½x 9	350	4,430	L	Optional
50	Brennan	6	4½x 5½	1,200	800	L	J. S. M.
50	Clay	2	9½x10	375	4,000	H	J. S. D. or M.
50	Driggs	6	4 x 6	1,000	...	L	J. S. M.
50	Fay & Bowen	6	4½x 5½	1,000	1,275	..	J. S. D. M.
50	Frisbie	6	4¾x 5	1,000	985	H	J. S. D. or M.
50	Frisco Standard	3	8¾x10½	300	6,480	H	M. B. M.
50	Knox	4	7 x 8	...	3,200	T	J. S. M.
50	Miller	4	6 x 9	450	2,500	L	J. S. M.
50	Peerless	4	5¼x 7	700	1,600	T	J. S. M.
50	Palmer	4	7¼x10	400	4,200	T	J. S. D. M.
50	Ralaco	4	7 x 9	425	4,800	H	M. B.
50	Regal	4	7½x 9	450	4,600	L	M. B. or J. S.
50	Reliable	2	9¼x11	350	...	H	J. S. M.
50	Standard Oil	4	7½x10	375	5,400	L	M. B. or . S.
50	Sterling	4	4¾x 5½	1,500	620	T	J. S. M.
50	20th Century	4	6½x 8½	450	3,400	L	J. S. M.

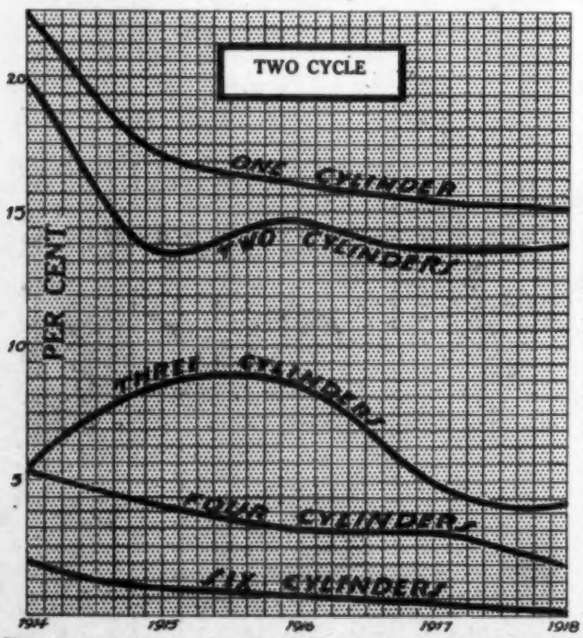
The Four-Cycle Motors of Nineteen-Eighteen

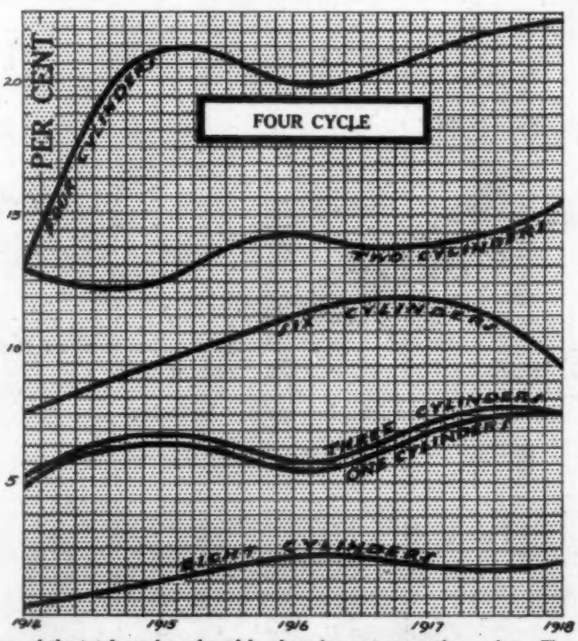
54 to 80 Horsepower Inclusive

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
54	Standard	6	6 x 8	400	3,200	H & S	M. B. M.
55	Acme	3	8¾x10½	300	6,950	H	Optional
55	Acme	6	6¼x 7½	450	4,825	H	Optional
55	Doman	4	7 x 9	500	2,950	T	J. S. M.
55	Gaeth	6	5½x 8	600	2,800	..	M. B. & J. S. M.
55	Scripps	6	4½x 5	1,400	950	L	J. S. M.
55	Sterling	4	5½x 6¾	800	1,850	T	J. S. D. M.
55	Vulcan	3	8¾x10½	400	4,500	T	Optional
60	Automatic	6	5½x 7	550	2,750	L	J. S.
60	Brennan	4	5½x 6	1,050	1,000	L	J. S. M.
60	Buffalo	4	5½x 7	900	1,730	L	J. S. D. M.
60	Clifton	6	6½x 7	600	3,500	L	J. S. M.
60	Doak	4	8 x10	350	6,400	H	J. S. M.
60	Doman	6	6 x 6	800	1,850	T	J. S. M.
60	Doman	6	6 x 8	500	3,500	T	J. S. M.
60	Hall	6	5½x 8	500	3,400	L	Optional
60	Lisk	6	6 x 7	500	1,600	T	J. S. D. or M.
60	Missouri	6	7 x 8	...	...	L	J. S. D. or M.
60	Murray & Tregurtha	4	7½x10	375	4,000	L	M. B. M.
60	Niagara	4	5½x 6¾	900	1,525	T	J. S. D. or M.
60	Palmer	6	6¾x 8	400	3,800	T	J. S. D. M.
60	Standard	6	6 x 6½	700	1,500	H & S	M. B. M.
60	Standard Oil	3	9 x12	330	6,200	L	M. B. or J. S.
60	Sterling	6	5½x 8	500	3,700	L	J. S. M.
60	Wisc. Consistent	6	4¾x 5½	1,000	1,125	T	J. S. M.
60	Wolverine	3	9½x12	300	7,000	L	J. S. D. M.
62	Wisc. Consistent	4	5¼x 7	900	1,050	T	J. S. M.
65	Acme	4	8¼x10	375	7,800	H	M. B. M.
65	Clifton	3	8½x11	400	4,500	L	J. S. M.
65	Frisco Standard	4	8 x10	360	6,475	H	M. B. M.
65	Miller	4	7 x10	400	3,500	L	J. S. M.
65	Speedway	6	4½x 5½	1,200	1,200	L	J. S. M.
70	Automatic	4	7½x 9	500	4,800	L	J. S.
70	Buffalo	6	7 x 9	350	4,850	L	J. S. D. M.
70	Harris	4	8 x10	350	5,500	..	M. B. or J. S.
70	Sterling	6	6½x 9	400	3,600	H & S	J. S. D. M.
70	Vulcan	6	7½x 8½	425	4,750	T	Optional
70	Wisc. Consistent	6	5 1-10x 5½	1,000	1,150	T	J. S. M.
72	Gaeth	6	5¼x 8	800	2,000	..	M. B. & J. S. M.
72	Wisc. Consistent	4	5¼x 7	900	1,100	T	J. S. M.
75	Acme	6	7¼x 9	425	6,150	H	Optional
75	Anderson	3	9¼x11	400	4,500	T	J. S. M.
75	Automatic	3	10 x14	275	8,000	L	Optional
75	Automatic	6	6½x 8	500	4,250	L	J. S.
75	Automatic	6	7½x 9	350	6,500	L	Optional
75	Doak	3	9½x11	300	10,000	H	J. S. M.
75	Elco	4	5½x 6	1,300	1,090	L	J. S. M.
75	Fay & Bowen	6	5 x 6¾	1,100	1,480	..	J. S. D. M.
75	Frisbie	6	6 x 6	800	1,800	H	J. S. D. or M.
75	Knox	6	7 x 6	...	4,500	S	J. S. M.
75	Ralaco	6	7 x 9	435	6,600	H	M. B. or J. S.
75	Scripps	6	4¾x 6	1,300	1,100	L	J. S. M.
75	Standard	4	8 x10	400	5,300	H & S	M. B. M.
75	Standard Oil	3	10 x14	275	14,000	L	M. B. or J. S.
75	Sturtevant	4	4½x 6	1,500	650	T	J. S. M.
75	20th Century	6	6½x 8½	450	4,500	S	J. S. M.
75	Vulcan	4	8¾x10½	375	5,800	T	Optional
80	Brennan	4	6 x 6	1,050	1,100	L	J. S. M.
80	Buffalo	4	6¼x 9	800	2,600	L	J. S. D. M.
80	Frisco Standard	3	9¾x12	280	9,105	H	M. B. M.
80	Hall	4	8 x12	400	7,000	L	Optional
80	Murray & Tregurtha	4	8½x11	350	5,000	H	M. B. M.
80	Niagara	4	6¼x 7	900	1,650	T	J. S. D. or M.
80	Palmer	6	7½x10	400	5,600	T	J. S. D. M.
80	Rathburn	3	10¾x13	300	13,000	H	M. B.
80	Standard Oil	4	9 x12	330	7,500	L	M. B. or J. S.
80	Wisc. Consistent	6	5¼x 7	800	1,450	T	J. S. M.
80	Wolverine	3	11 x12	300	7,516	L	J. S. D. M

85 Horsepower and Over

Rated H.P.	Motor	No. of Cyl.	Bore & Stroke	R.P.M.	Wt. Lbs.	Location of Valves	Ignition
85	Acme	4	8¾x10½	350	9,200	H	M. B. M.
85	Doman	6	7 x 9	500	4,200	T	J. S. M.
85	Frisco Standard	4	8¾x10½	350	8,920	H	M. B. M.
85	Sterling	4	5½x 6¾	1,200	1,600	T	J. S. M.
85	Sterling	6	5½x 6¾	800	2,350	T	J. S. D. M.
90	Automatic	3	10½x15	250	.....	T	J. S.
90	Clifton	4	8½x11	400	5,200	L	J. S. M.
90	Doak	6	8 x10	350	9,500	H	J. S. M.
90	Murray & Tregurtha	4	9 x12	325	6,000	H	M. B. M.
90	Speedway	4	5¾x 7	1,200	1,350	L	J. S. M.
90	Wisc. Consistent	6	5¾x 7	800	1,500	T	J. S. M.
95	Murray & Tregurtha	5	8½x11	325	5,200	H	M. B. M.
100	Acme	6	8¾x10	400	10,400	H	Optional
100	Anderson	4	9¾x11	400	5,500	T	J. S. M.
100	Automatic	4	10 x14	275	11,780	L	Optional
100	Automatic	4	8½x10	500	6,100	L	J. S.
100	Buffalo	4	10 x12	300	8,200	L	J. S. D. M.
100	Clay	4	8½x10	375	6,500	H	J. S. D. or M.
100	Curtis	8	4 x 5	1,400	390	H	J. S. M.
100	Doak	4	9½x11	300	12,000	H	Optional
100	Elco	6	5¾x 6	1,300	1,350	L	J. S. M.
100	Harris	6	8 x10	350	7,600	..	M. B. or J. S.
100	Murray & Tregurtha	6	6½x 9	500	3,000	H	J. S. M.
100	Murray & Tregurtha	6	7½x10	400	....	H	M. B. M.
100	Niagara	6	5½x 7	900	2,145	T	J. S. D. or M.
100	Standard	6	8 x10	400	8,000	H & S	M. B. M.
100	Standard Oil	5	9 x12	330	8,800	L	M. B. or J. S.
100	Standard Oil	4	10 x14	275	17,000	L	M. B. or J. S.
100	Sterling	4	5½x 6¾	1,400	1,275	T	J. S. M.
105	Automatic	6	7½x 9	500	7,000	L	J. S.
110	Frisco Standard	4	11¾x15	250	13,800	H	M. B. M.
110	Wolverine	3	12½x14	300	11,130	L	J. S. D. M.
115	Speedway	6	6¾x 8½	600	5,000	L	J. S. M.
115	Standard	8	5½x 6¾	800	2,700	T	J. S. D. M.
120	Automatic	4	10½x15	250	.....	T	J. S.
120	Frisco Standard	4	9¾x12	310	13,250	H	M. B. M.
125	Acme	6	8¾x10½	375	12,800	H	Optional
125	Hall	6	8 x12	400	10,000	L	Optional
125	Murray & Tregurtha	6	8½x11	325	6,200	H	M. B. M.
125	Scripps	6	5 x 7	1,300	1,750	L	J. S. M.
125	Sterling	6	5½x 6¾	1,200	2,050	T	J. S. M.
145	Sterling	6	5½x 6¾	1,400	1,650	T	J. S. M.
150	Anderson	6	9¾x11	400	7,500	T	J. S. M.
150	Automatic	6	10½x15	250	.....	T	J. S.
150	**Buffalo**	**6**	**10 x12**	300	12,800	L	J. S. D. M.
150	Doak	6	9½x11	300	18,000	H	J. S. M.
150	Niagara	6	6¾x 7	900	2,350	T	J. S. D. or M.
150	Speedway	6	5¾x 7	1,200	1,800	L	J. S. M.
150	Speedway	6	8½x10	500	5,900	L	J. S. M.
150	Standard	6	8½x11	400	5,800	H & S	M. B. M.
160	Wolverine	6	9½x12	400	12,778	L	J. S. D. M.
170	Sterling	8	5½x 6¾	1,200	2,600	T	J. S. M.
170	Thomas "V"	8	4¼x 5½	2,200	538	L	J. S. M.
175	Frisco Standard	4	11¾x15	275	20,220	H	M. B. M.
200	Curtis	8	5 x 7	1,400	690	H	J. S. M.
200	Doak	4	12¾x15	285	30,000	H	J. S. M.
200	Niagara	8	6¾x 7	900	3,010	T	J. S. D. or M.
200	Speedway	8	5¾x 7	1,200	2,300	L	J. S. M.
200	Sterling	8	5½x 6¾	1,400	2,400	T	J. S. M.
200	Sterling	8	8¾x10	500	7,000	L	J. S. M.
200	Wolverine	6	11 x15	300	18,236	L	J. S. D. M.
210	Thomas "V"	8	4½x 5¾	2,200	560	L	J. S. M.
250	Speedway	6	11 x12	450	11,400	L	J. S. M.
250	**Sterling**	**8**	5½x 6¾	1,700	1,495	H	J. S. M.
260	**Duesenberg**	6	6¾x 7¾	1,300	3,250	S	J. S. D. M.
300	**Doak**	6	12¾x15	285	43,000	H	J. S. M.
300	Sterling	8	6¾x 9	1,000	5,000	T	J. S. M.
360	Duesenberg	8	6¾x 7¾	1,300	3,600	S	J. S. D. M.





These two sets of curves show the distribution, according to the number of cylinders, of the total number of models of marine motors on the market. These curves do not represent the actual number of motors of each model sold, they refer only to the number of models on the market.

Wireless Telegraphy and the Motor Boat

What the Past Decade Has Developed By Way of Apparatus Which Insures Communication Between Small Craft and Main Land

By Austin C. Lescarboura

WHY should a motor boat be equipped with wireless? How much does a wireless outfit cost? What can be done with a wireless set when it is once installed?

Typical are these questions of the motor boat owner who is interested in wireless telegraphy with a view to applying it to his needs. They are well chosen, too; for if they are answered properly they serve to lay before all motor boat owners the entire case of wireless telegraphy from their point of view.

To begin with, compare the telephone in the home with wireless on the pleasure boat. Both are not absolutely necessary; there are millions who get along without the telephone in their homes, just as there are thousands who get along without wireless on their boats. But once the home folk have tried the telephone and have discovered its convenience, they are not likely to do without it again, provided they can afford the rental. So too with wireless; once the motor boat owner has tried it, he is not likely to do without it, provided he can afford the initial cost. In either case it is a matter of becoming acquainted with the service before its worth can be fully appreciated. Particularly in instances of distress, when help must be summoned, is either the telephone or wireless most appreciated. At such times either one may be the means of saving life and property—a service which simply cannot be estimated in terms of dollars and cents.

All of which means that wireless telegraphy must be actually tried out before its worth can be fully appreciated.

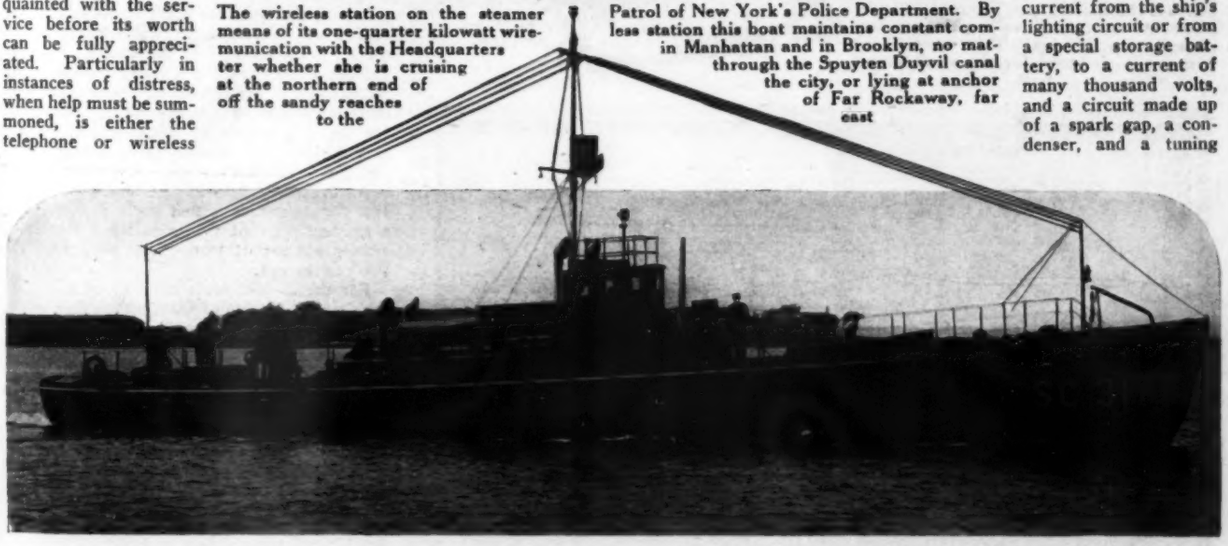
Within recent years the progress in wireless telegraphy has been considerable, not so much in the art as a whole, but in the details. A decade ago the motor boat owner would have had a hard time to equip his boat with wireless. Then, there were no really reliable instruments for amateur use on the market. To be sure, there were many which were offered for such service, but they were crude and costly and uncertain of result. During the last few years amateur wireless apparatus has been developed along substantial lines, and to-day the motor boat owner or anyone else in the market for good, inexpensive apparatus for short-distance work, has no difficulty in fulfilling his requirements.

Perhaps the main difference between to-day and ten years ago is that a wireless set purchased now is a finished product, representing the consummation of years of laboratory experimentation, whereas in former days the amateur apparatus available involved a good deal of patient tinkering on the part of the purchaser before it could be made to give the best results. And while there is nothing more interesting than wireless experimenting, it is obviously more satisfactory for the busy man to purchase a complete set which, when installed according to directions, will permit communication from the very first.

A modern wireless set is hardly more complicated than the usual gasoline engine. It consists of two main members, the transmitter and the receiver, both of which are made up of a number of instruments. And in order to operate these two main members, a third one is necessary, namely, a circuit comprising a number of elevated, insulated wires known as the aerial, and a ground connection which, on shipboard, may be in the form of a clamp on a water pipe or a copper or zinc sheet placed out board.

The transmitter is an arrangement of induction coil or transformer for stepping up the current from the ship's lighting circuit or from a special storage battery, to a current of many thousand volts, and a circuit made up of a spark gap, a condenser, and a tuning means. The high voltage current is induced in the special circuit, and as it crackles across the spark gap the wireless waves are generated. These waves, known as Hertzian waves, have the peculiar property of traveling through space in all directions from their source, at the astounding speed of 186,300 miles per second.

The wireless station on the steamer Patrol of New York's Police Department. By means of its one-quarter kilowatt wireless station this boat maintains constant communication with the Headquarters in Manhattan and in Brooklyn, no matter whether she is cruising through the Spuyten Duyvil canal at the northern end of the city, or lying at anchor off the sandy reaches of Far Rockaway, far to the east



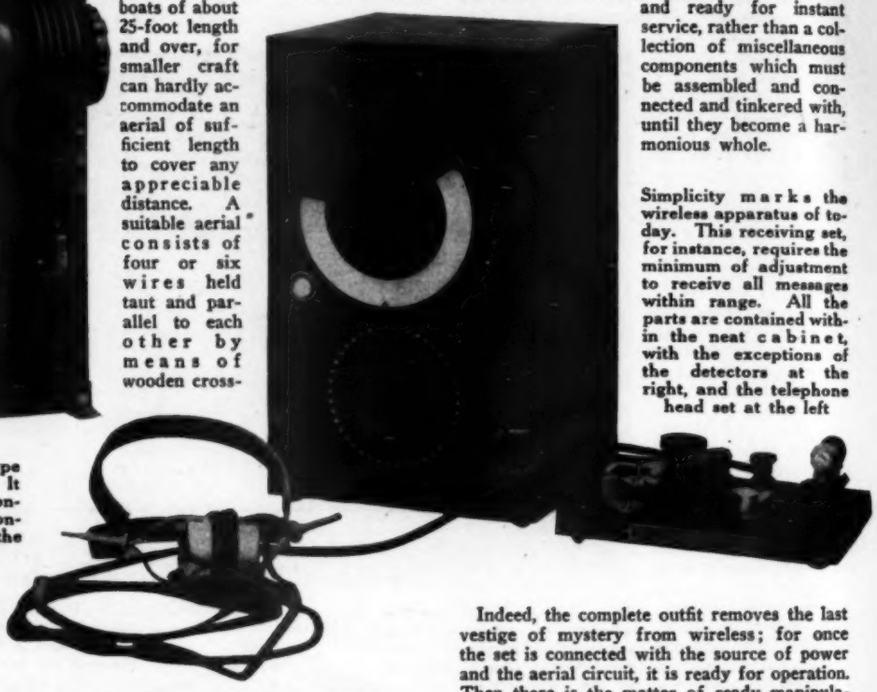
The wireless on this motor boat may now be sending out messages which will decide the destinies of the world

For distances over one hundred miles this type of transmitter is ideal for the motor boat. It is of the panel design and entirely self-contained. The two knobs below the motor control the tuning means and switch either the transmitter or the receiver into the aerial circuit, so that the operator can send or receive. The member just below these knobs is the spark gap. The remaining instruments are for controlling the current-generating apparatus. This set (below) is specially designed for the small motor boat

The receiver, on the other hand, requires practically no current, for it receives its current from space in the form of wireless waves sent out by other stations. It consists generally of a tuning means, an instrument known as a detector which converts the waves so that they may be detected, and a pair of telephone receivers which, worn on the head of the operator, enable him to detect the waves by audible means. The tuning means merely serve to attune the transmitter and receiver one with the other.

Both the transmitter and receiver are connected to the aerial circuit. Indeed, it is the aerial which really limits the use of wireless to motor boats of about 25-foot length and over, for smaller craft can hardly accommodate an aerial of sufficient length to cover any appreciable distance. A suitable aerial consists of four or six wires held taut and parallel to each other by means of wooden cross-pieces known as spreaders, the latter, in turn, being suspended from masts, if these are available, or by a mast and other structure. The higher the aerial wires are elevated the better the results; hence every effort should be exerted to raise the aerial to at least 15 feet, even at the expense and trouble of adding another length to the masts. While it is preferable to have the aerial wires horizontal, there is no great handicap in having them inclined in instances where only one mast is available, or where the masts are of unequal heights.

In purchasing wireless equipment for his boat the motor boatman need not experience any unnecessary difficulty. Complete outfits and separate instruments are available; but if he has not had a wide experience in this field it will be far more satisfactory for him to purchase a complete outfit, assembled and wired and ready for instant service, rather than a collection of miscellaneous components which must be assembled and connected and tinkered with, until they become a harmonious whole.



Simplicity marks the wireless apparatus of today. This receiving set, for instance, requires the minimum of adjustment to receive all messages within range. All the parts are contained within the neat cabinet, with the exceptions of the detectors at the right, and the telephone head set at the left

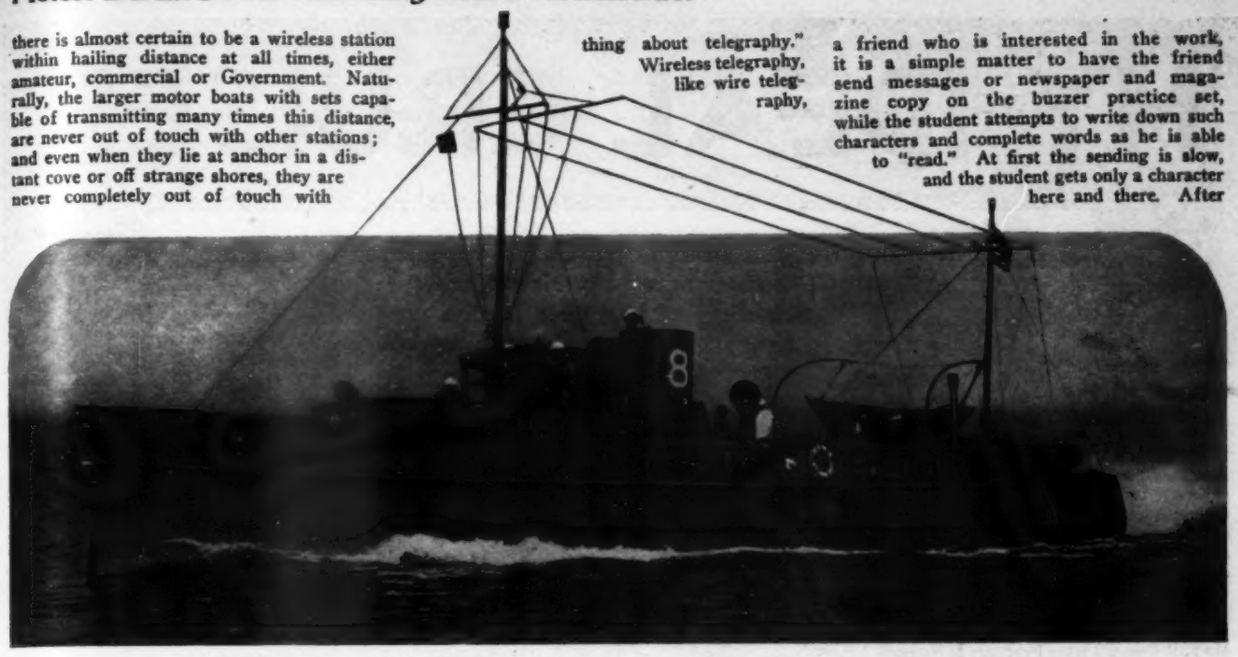
Indeed, the complete outfit removes the last vestige of mystery from wireless; for once the set is connected with the source of power and the aerial circuit, it is ready for operation. Then there is the matter of ready manipulation: in complete outfits everything is designed for the convenience of the operator. There is a minimum of handles to be manipulated; and the possibilities of the set getting out of order are reduced to infinitesimal proportions. But the main fact is that the complete set is a finished piece of work, guaranteed to do a certain amount of work if the directions are but carried out.

For the 25-foot craft the cost of a modest wireless set capable of transmitting five to ten miles and receiving a hundred or two hundred miles, need not be more than fifty dollars. As the size of the craft increases, however, the size of the wireless set may also be increased; so with a boat 35 or 45 feet in length a set capable of transmitting about 25 miles and receiving a few hundred miles, may be installed at a cost of somewhat over one hundred dollars.

Motor boats of greater length than those already mentioned, may be equipped with sets capable of transmitting a hundred or more miles and receiving over distances of five hundred miles under normal conditions. Such sets, of course, begin to compare favorably with commercial shipboard sets, and the cost mounts up into the hundreds of dollars.

The owner of the 25-footer need not despair of getting good wireless results, for the reason that a transmitting range of five to ten miles is ample in his case. If the craft always plies the usual shipping lanes, and never puts out to sea farther than ten miles or so off shore,

there is almost certain to be a wireless station within hailing distance at all times, either amateur, commercial or Government. Naturally, the larger motor boats with sets capable of transmitting many times this distance, are never out of touch with other stations; and even when they lie at anchor in a distant cove or off strange shores, they are never completely out of touch with



Wireless is now part of the regular equipment on a majority of the express cruisers of the day

affairs back home or even happenings abroad.

There is a wireless set for every sized boat and for every pocketbook. Any time the motor boatman arrives at the conclusion that his craft needs wireless telegraphy, he has but to drop a line to one or more of the manufacturers of such equipment, telling them what distance he would like to cover and what accommodations for a wireless apparatus are available on his craft. Particularly should he give all information possible concerning the space and height available for the aerial, for after all is said and done it is this member of a station which determines its size.

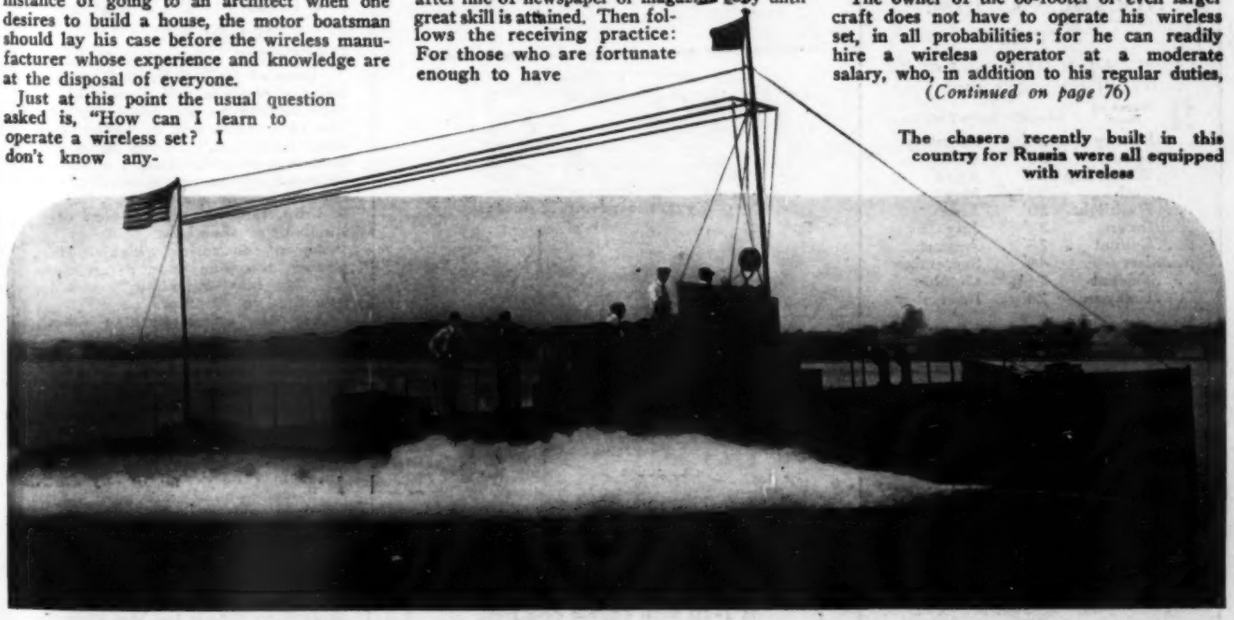
Upon the receipt of the information the wireless manufacturer is in a position to furnish specifications for the proper set. He is also able to make suggestions in the form of slight changes in the mast rigging, which may permit the use of a larger aerial, and, accordingly, a more powerful set. At any rate, just as in the instance of going to an architect when one desires to build a house, the motor boatsman should lay his case before the wireless manufacturer whose experience and knowledge are at the disposal of everyone.

Just at this point the usual question asked is, "How can I learn to operate a wireless set? I don't know anything about telegraphy." Wireless telegraphy, like wire telegraphy, makes use of a telegraph code consisting of dots and dashes, in the transmission of intelligence. While at first this may appear a stumbling block to many who would otherwise undertake the operation of a little set, it is not so formidable an obstacle as it seems. Wireless telegraphy may be readily mastered by attending a course in one of the several telegraph schools scattered throughout the United States, or at home. In the former instance the tuition is quite inexpensive, and an apt learner should know enough by the end of the third month. But for those who prefer to learn at home there is a good self-taught method. This consists of first memorizing the Continental telegraph code, and then repeating the various letters and characters in the form of short and long buzzes, on a standard telegraph key inserted in a circuit containing a battery and buzzer. After the Continental code is entirely memorized, the student should "send" line after line of newspaper or magazine copy until great skill is attained. Then follows the receiving practice: For those who are fortunate enough to have a friend who is interested in the work, it is a simple matter to have the friend send messages or newspaper and magazine copy on the buzzer practice set, while the student attempts to write down such characters and complete words as he is able to "read." At first the sending is slow, and the student gets only a character here and there. After a while he is able to get entire words, and, later, sentences. Then the sending is speeded up, and still the student is able to keep pace, signifying that he has become a skilled operator.

Another self-taught method is to "listen-in" on one's wireless set for a few hours every day, trying to copy down such letters and words as are understood. At first but little is "read"; but in a short while the student is able to copy down entire sentences with ease. No matter what method is followed, the normally-intelligent student should be able to master wireless operating in anywhere from three to six months. Even without a thorough knowledge of wireless telegraphy, anyone can receive weather reports and storm warnings sent out by Government stations, as well as the standard time, which information alone is often worth many times the expense of a receiving set when used alone.

The owner of the 60-footer or even larger craft does not have to operate his wireless set, in all probabilities; for he can readily hire a wireless operator at a moderate salary, who, in addition to his regular duties,

(*Continued on page 76*)



The chasers recently built in this country for Russia were all equipped with wireless

MY IDEAL CRUISER

A Summary of the Ten Designs Which Have Appeared in MoToR BoatinG—Subscribers May Now Vote for the Selection of the Best Design

THE Ideal Cruiser Series which has been appearing in MoToR BoatinG since February, 1917, has been a great success. When we announced the series in our January issue, we had no idea that it would prove so popular. We have been literally swamped with designs, a majority of which were well worthy of publication. However, it was necessary to draw the line somewhere, and as the result we chose ten of the plans submitted which we thought best represented the range of possibilities of the small cruiser. One set of these plans has been published in each issue of MoToR BoatinG from February to November, inclusive. We hope our selection has met with the approval of our readers.

As we have announced many times, we are going to allow the subscribers to MoToR BoatinG the privilege of "Picking the Winner". We know of none more qualified to decide which one of the ten designs that have been appearing in MoToR BoatinG since last February best meets the requirements of "My Ideal Cruiser".

Votes must reach the Editor on or before December 31, 1917. The result of the balloting will be announced in the February number of MoToR BoatinG.

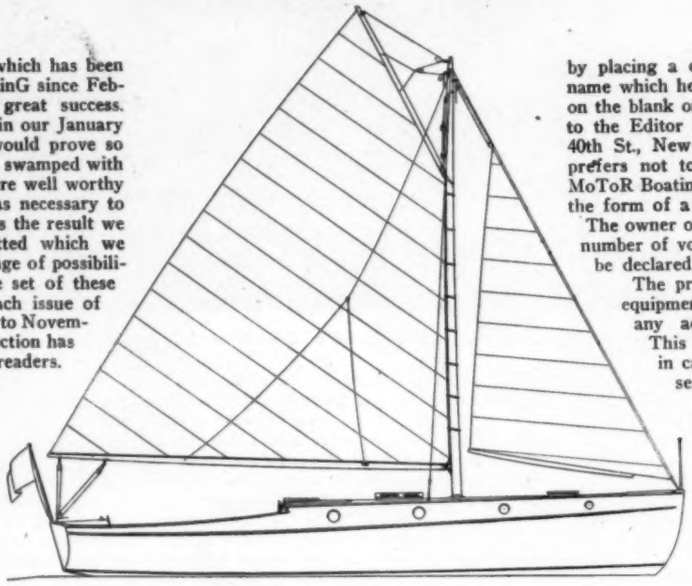
Each subscriber is entitled to one vote. He may designate his choice by placing a cross at the left of the boat's name which he selects as the "Ideal Cruiser", on the blank on this page, returning the blank to the Editor of MoToR BoatinG, 119 West 40th St., New York City. If the subscriber prefers not to cut or mutilate his copy of MoToR BoatinG he may write us his choice in the form of a letter or postal.

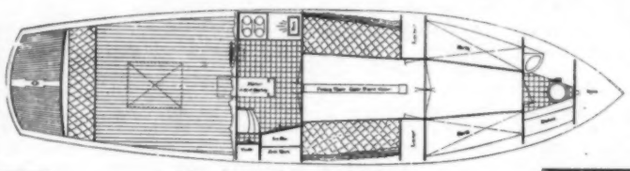
The owner of the boat receiving the greatest number of votes before January 1, 1918, will be declared the winner.

The prize will be $100 worth of boat equipment, selected by the winner from any advertiser in MoTor BoatinG. This prize is in addition to the $50 in cash which has already been presented to the designer of each boat, plans of which have appeared in MoToR BoatinG.

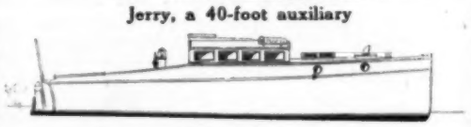
Should two or more designs receive the same and an equal number of votes so that a tie would be created for first choice, then instead of dividing the $100 worth of equipment among the designers of the tied boats, MoToR BoatinG will present $100 worth of equipment to each designer.

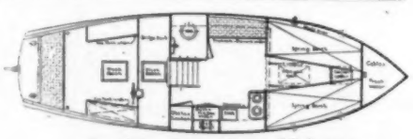
In voting for the winner of the Ideal Cruiser series subscribers should be careful to give the address at which their copy of MoToR BoatinG is regularly received.



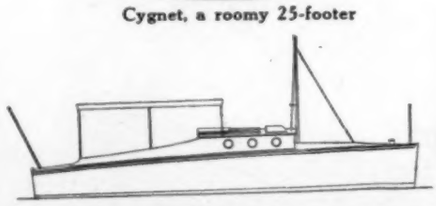


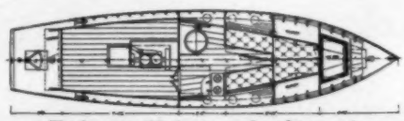
Jerry, a 40-foot auxiliary





Cygnet, a roomy 25-footer





Trident, a 25-foot trunk-cabin cruiser

Vote for Winner of My Ideal Cruiser Series

(Vote by placing a cross at the left of the boat's name)

Vote Here	Name of Boat	Length	Issue Published
....	Sunray	36′	February
....	Spook	36′	March
....	White Cap	26′	April
....	Ruth	38½′	May
....	Flashlight	30′	June
....	Dawn	32′	July
....	Cygnet	25′	August
....	Jerry	40′	September
....	Trident	24¼′	October
....	Halcyon	28′	November

Name of subscriber.....

.....

Address of subscriber.....

.....

Vote must be sent to the Editor of MoTor BoatinG, 119 West 40th St., New York City, and be received on or before December 31, 1917.

Note: Votes received from persons or readers other than regular subscribers will not be considered. Subscribers on the books as of December 1, 1917, as well as new subscribers whose subscriptions are received prior to January 1, 1918, may vote.

Scale of all plans on pages 37 and 38 is 1-10 inch equals one foot.

A New Series of Plans—"My Ideal Runabout"

BEGINNING with the February issue of MoToR BoatinG, a new series of designs will appear along lines similar to the Ideal Cruiser. The new series will be called "My Ideal Runabout." Each issue will contain a complete design, including outboard profile, arrangement plans, construction details, sections, full set of lines, table of offsets, etc., of a runabout or open boat.

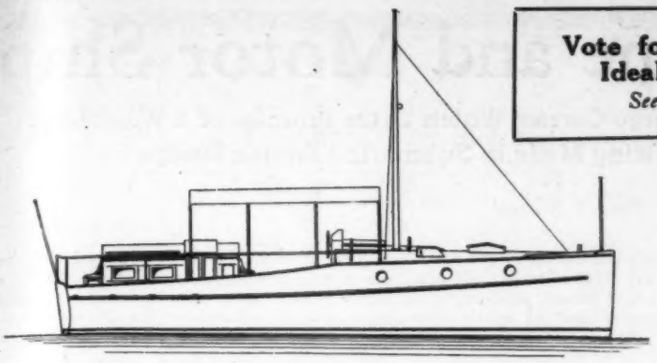
As in the series which is just closing, the plans and descriptions for "My Ideal Runabout" must be submitted by amateurs.

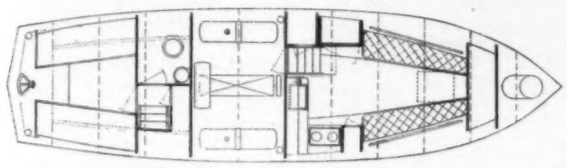
Any one interested may submit plans for "My Ideal Runabout" series. There is no limitation to the size, speed, or type of the runabout. It may be round or V-bottom.

Designs may be submitted any time after Dec. 1, 1917, up to May 15, 1918. Drawings should be in ink either on paper or tracing cloth. These may be drawn to any scale. A description of not over 2,500 words should accompany the plans.

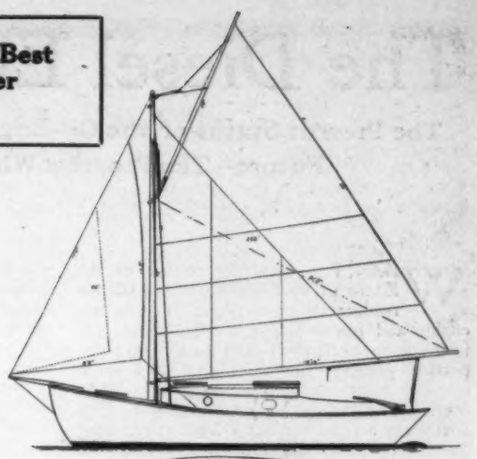
For each set of plans which we publish we will pay $35 in cash. In addition to this amount we will present $75 worth of boat equipment to the owner of that design which our subscribers vote is the best after the last design has been published.

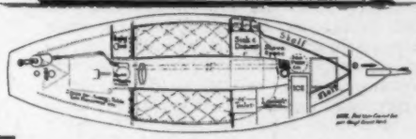
Vote for the Best Ideal Cruiser
See page 36





Sunray, a 36-foot double-cabin cruiser

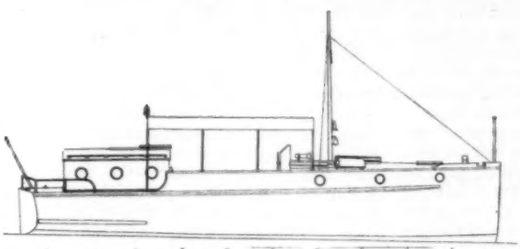


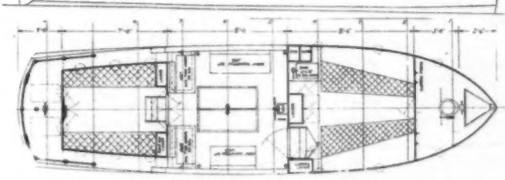


White Cap, a 26-foot auxiliary

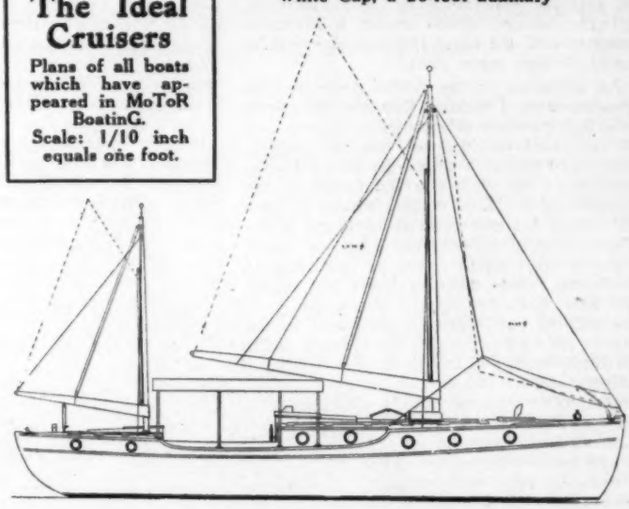
The Ideal Cruisers

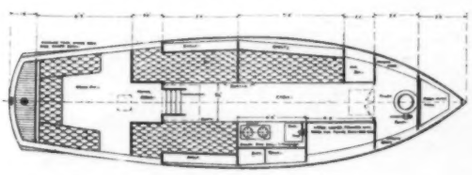
Plans of all boats which have appeared in MoToR BoatinG. Scale: 1/10 inch equals one foot.

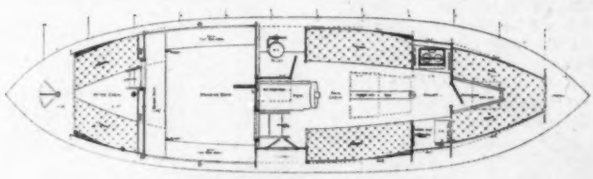




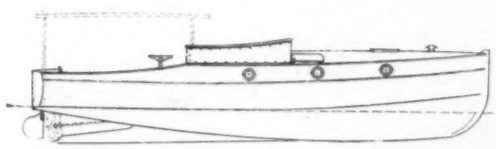
Dawn, a 32-footer



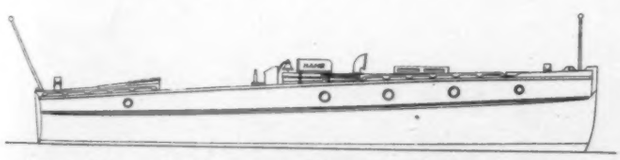


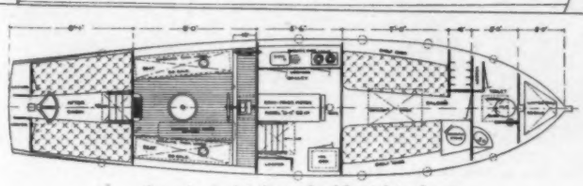


Ruth, a 40-foot auxiliary

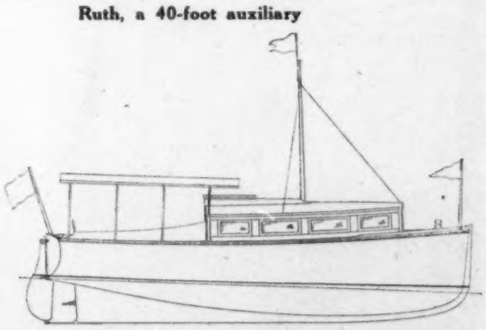


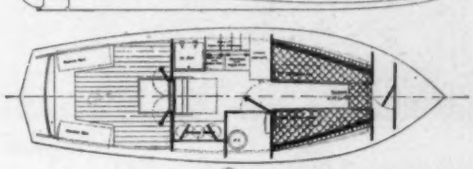
Flashlight, a V-bottom 30-footer





Spook, a 36-foot double-cabin boat





Halcyon, a 28-footer

The Diesel Engine and Motor Ship

The Present Status of the Oil-Engined Cargo Carrier Which Gives Promise of a Wonderful Future—The Progress Which Is Being Made in Submarine Engine Design

By J. Rendell Wilson

WHEN I accepted the request of the Editor of MoToR BoatinG to tell his readers all about present marine oil-engine and motor ship practices, it was my intention to dwell upon some of the very important developments that have been made abroad since the war. But, the greatest engineering progress has been with the naval-type Diesel engine, and the Navy Department since has expressed a wish, through the Committee of Public Information, that nothing important concerning war vessels of our Allies shall be made public, particularly dimensions and horsepower, so, any revelations likely to be of tangible value to our enemies perforce must be left to a more opportune time. Although I have reason to believe that early in the coming year the "powers-that-be" will themselves lift the curtain, when almost unbelievable progress with the naval Diesel engine will be found to have taken place.

An indication of the strides made may be apparent when I mention that there are some very high-powered submarines in the services of the allied nations, and that the engine-builders of one such submarine took a single-cylinder of the same size and design as the cylinders of its Diesel engines and on the test bed obtained a power,—well, that was somewhere between 400 and 800 b.h.p.,—a vague statement that means a lot; but otherwise is confusing. How many cylinders per engine and how many engines per submarine there are and the power actually developed in the vessels we need not oblige the German secret service by stating at this time. But it is most unfortunate that these craft at present have practically no opportunity to be effectively used against the Teutonic battlefleet. When the Kaiser's fleet does come out of its "hole," it may receive an unpleasant shock. However, they are doing some good work quietly. Also, I think it will not be long before France will have published some details of the operations of her fleet of large Diesel-driven submarine coastwise patrol vessels, which are giving such good services, and of which there are a great many. The French naval authorities, I understand, are of the opinion that, for protection of the French coastwise shipping, moderate-sized vessels having speeds a little higher than the speed of U-boats, and of sufficient displacement to carry fairly heavy guns are excellent for the purpose of effective submarine offshore and coastwise patrolling. This policy and belief enabled them to quickly place in service a silent and smokeless fleet of twin-screw Diesel-driven vessels of fairly high power.

The U. S. Navy officials on the other hand now believe that only the destroyers are of use for operating in the heavy seas met with in the open-ocean section of the submarine zone, now covered by our destroyers, and that even craft of 500 tons are too small, and that in any event America is in a better position to build destroyers than Diesel-driven craft.

It is the writer's view, which may not count for much, that whatever Germany can do with Diesel-driven submarines the Allies can do better with Diesel-driven surface craft of about the same size, especially as the latest submarines of the Allies are larger and swifter than the best of Germany's U-boats.

Let me explain more clearly what I mean. Take as an example an armored (deck) submarine of 1,000 tons surface-displacement, fitted with two 1,500 b.h.p. Diesel engines, having a surface speed of 19 to 20 knots, and carrying two 4.7-inch guns. (Germany has such craft and is not the only country.)

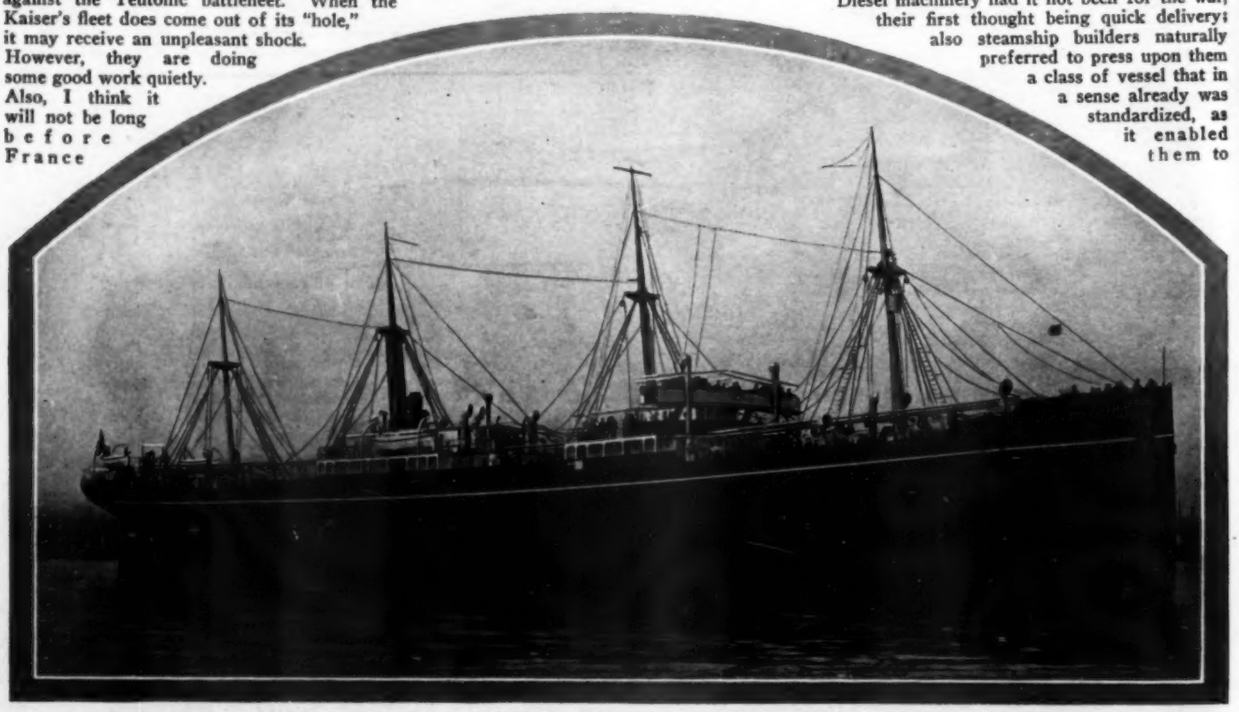
Now, it would be quite reasonable to place three submarine-type Diesel engines of the same power in a surface-vessel of equal strength and displacement, the absence of torpedoes, torpedo-tubes, balance tanks, etc., compensating for the extra engine. Slightly heavier guns also could be carried.

This would result in a Diesel-driven destroyer of about 1,000 tons displacement of 4,500 b.h.p. with a speed of 22 to 23 knots and armed with two 5-inch guns and having a full-speed fuel consumption of but 26½ tons per 24-hour day.

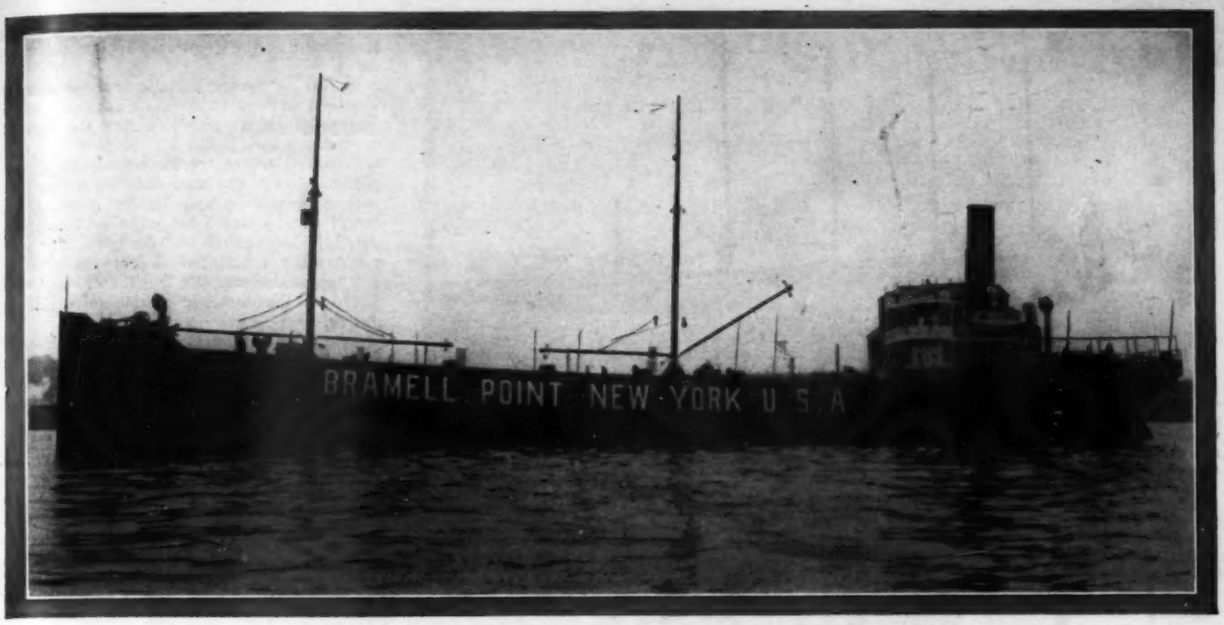
Washington, however, does not believe it is wisdom to experiment while we are in the midst of war when quick results urgently are needed. Possibly they are right, although, on the other hand the greatest weapons of this awful war are experiments developed since the war began, such as "tanks," giant aeroplanes, giant-submarines, poison-gas, liquid-fire, motor-propelled barges with huge guns, smoke curtains, camouflage, etc.

But that is wandering a little too far away from the main subject; although there is a connection because of the French motor patrol fleet, and because recently the Spanish Admiralty invited tenders for eighteen 400 h.p. marine Diesel engines for smaller craft of this class. Undoubtedly the war has interfered with the progress of the merchant type of marine Diesel engine. Not so much in increased powers as in a numerical sense, because, the attainment of very high power mainly is a matter of gradual development.

There are many ship builders, both in this country and abroad, who would have gone in for the building of motor ships and their Diesel machinery had it not been for the war, their first thought being quick delivery; also steamship builders naturally preferred to press upon them a class of vessel that in a sense already was standardized, as it enabled them to



A typical modern Diesel-driven ocean freight-carrier



America's highest-powered and largest steel-built motorship. She is equipped with Swedish-built motors

accept more orders while the high constructional prices ruled, so evidently they prefer to meet the future situation when it arrives, meanwhile to make hay whilst the sun is shining.

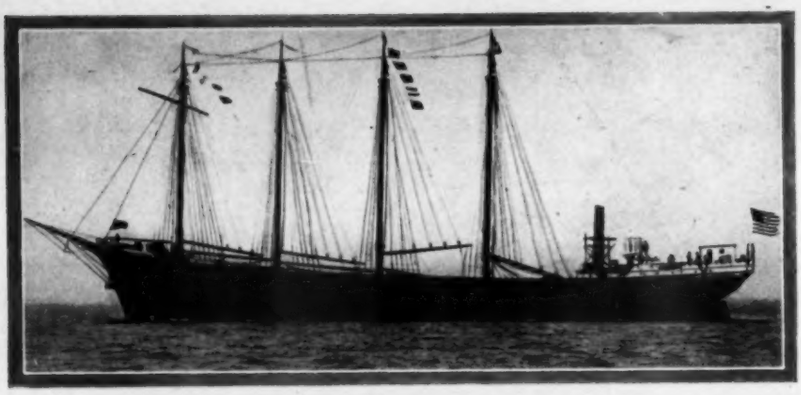
In the United States and Canada the marine oil-motor has fitted in splendidly with the wooden auxiliary programme, consequently a very large number have been built during the last two years. Many of these vessels have been successful, others almost failures. The latter has been due to several causes, one being ill-devised designs of hull, machinery and the manner of the installing of the machinery. Another cause has been that many shipowners have ordered auxiliary power in schooners, etc., but when the ships are in service operate the oil-engines just as if the ships were full powered. In their position as full-powered craft they immediately became under-powered, forming an overload on the engines, which were not meant to take such a severe strain.

Most of these vessels have been equipped with oil-engines of the surface-ignition class, often erroneously called "semi-Diesel" engines, and, generally speaking these engines have stood the strain excellently, even when continuously operating at these heavy overloads. From 5,000 tons down to 100 tons D.W.C. there really has been quite a little motorship boom in America during the last two years. In the face of 20 per cent customs-duty, and in the face of such domestic competition as there was, one Swedish surface-ignition oil-engine builder has engined no fewer than 61 American-built ships of 100 b.h.p. to 1,500 b.h.p., apart from supplying many smaller engines. This represents altogether about $5,000,000 if we include the auxiliaries, spares and fittings. Domestic engineers have calmly stood by watching, apparently with lanquid disinterest, and seen all this money go abroad, when it may well have been kept in the country and the orders placed with domestic companies.

An Italian marine Diesel engine produced during the war. Notice how its general characteristics differ from the American Diesel engines

American-built full-powered steel motor-vessels of reasonably large size can be counted on the fingers of two hands. The most ambitious of them were the four Cox & Stevens designed tank ships built at Baltimore to the account of a well-known and enterprising Scandinavian ship owner operating in New York City, and who it is said made a million dollars profit on their sale to various American oil companies. These vessels, one of 1,500 h. p. and three of 1,000 h.p., were powered with the Swedish oil-engines referred to. Two smaller steel motor ships recently were launched at Manitowoc, Wis. These also have Swedish engines. Among the Standard Oil Company's fleet of motor ships are six steel auxiliaries, also with Swedish engines.

But, nothing in the way of large full-pow-



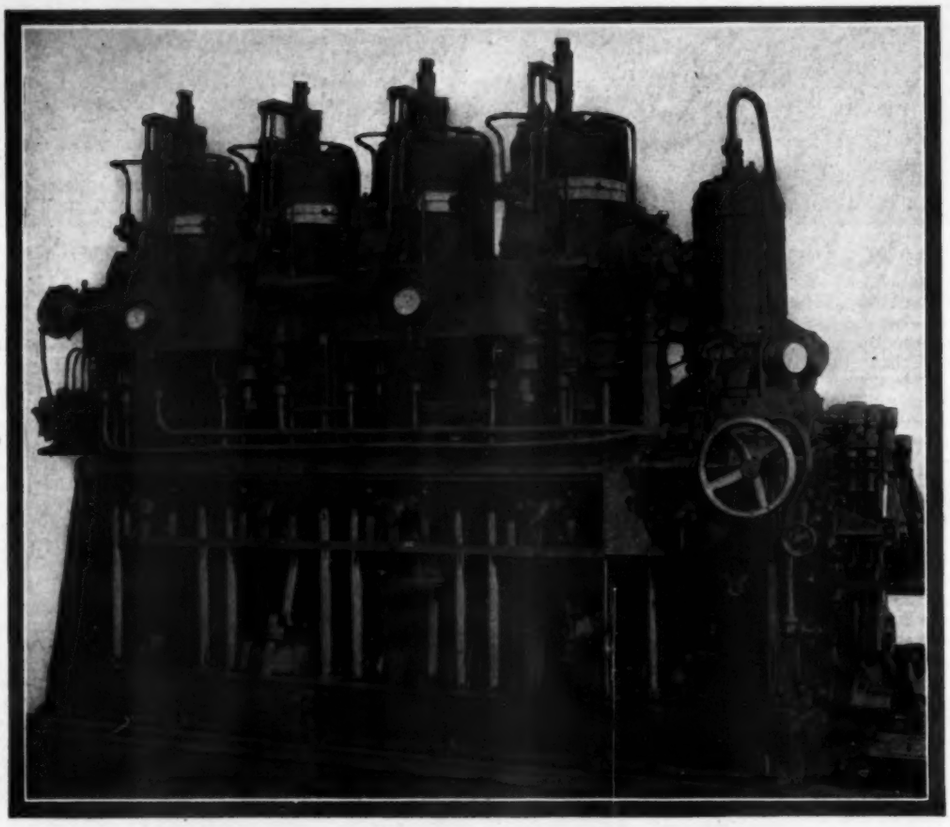
A fine example of a wooden motor auxiliary schooner, dozens of which are building around the coasts of the United States.

ered Diesel-driven merchant ships (similar to these splendid vessels that have been built in Europe in large numbers), have commenced construction in the United States. If America only had a thousand great Diesel motor ships similar to those owned by the East Asiatic Company she would be the greatest maritime nation on earth.

So far as present results are concerned it has been an unfortunate thing for the domestic marine oil-engine industry that the Government has requisitioned all shipping and shipbuilding. Because the Emergency Fleet Corporation has placed no orders for motor ships and apparently no ship builder is allowed to accept such orders from home or abroad. If the U. S. Shipping Board take quick action and place some substantial orders the situation will be saved; otherwise it will mean demoralization of the domestic marine oil-engine industry.

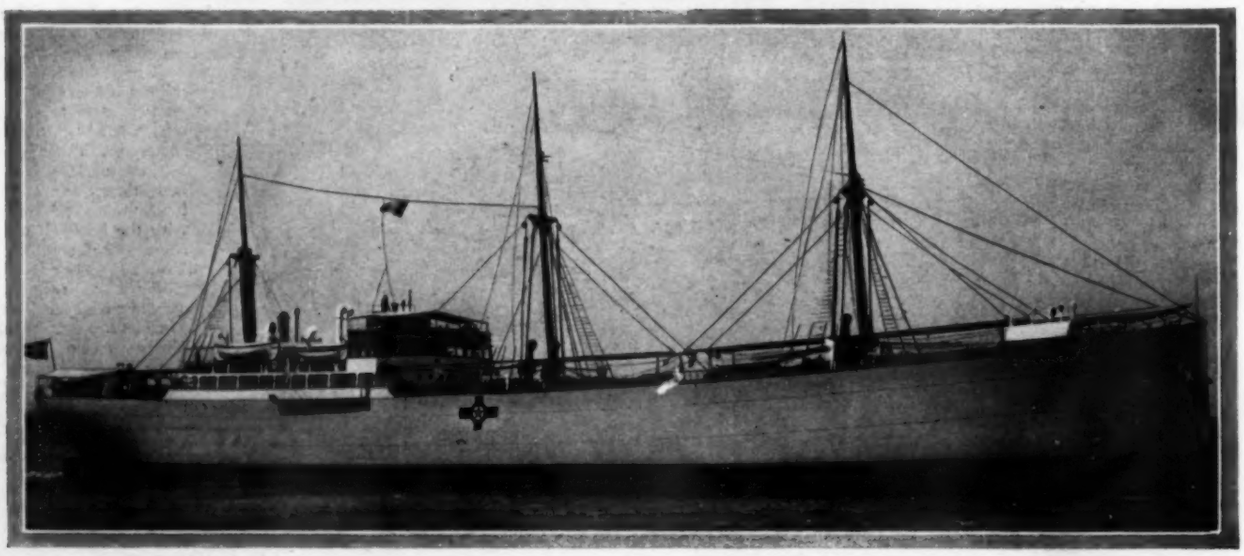
At present the various American Diesel, or "semi-Diesel," marine engine builders are exceedingly busy with orders contracted before the Government acquired the shipping; but, practically no new orders are coming along, and it seems as if their position will be very serious about next summer or towards the end of the coming year. Domestic ship owners now are doing very little indeed in the way of ordering new ships of any kind as they do not seem to know how they stand. Possibly the authorities have been too busy to fully anticipate or

(To be continued in January issue)



One of the great motorships of the East Asiatic Company, who soon will have 40 such vessels in service

A typical American designed and built Diesel engine.



Why Some Motors Are Uneconomical

The Difference Between the Fuel Problems of Yesterday and Those of To-day—The Development of the Hvid-Type Engine Which Runs on Low-Grade Fuels

By E. B. Blakely
Mechanical Engineer, Sears, Roebuck Co.

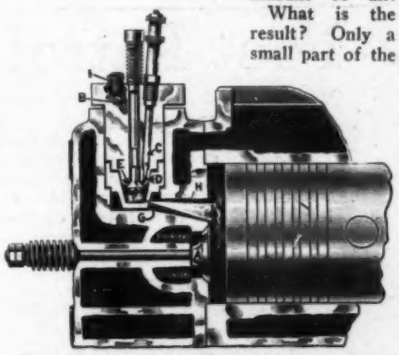
NEARLY a year has passed since I brought to the attention of readers of MoToR BoatinG the Hvid type engine, in my article entitled, "The Fuel Problem Solved." The interest which this article aroused all over the world, and the hundreds of letters received asking for more information, show that most motor boat enthusiasts, as well as manufacturers, are fully aware of what we are up against as regards the fuel situation. In this present article I am going to try to bring home as forcibly as I can, the reasons why the fuel problem can only be properly solved by development of the Hvid, Diesel or similar principles.

Have you noticed how much more frequently you hear of carbon troubles, stuck rings, lubricating and carbureter difficulties than formerly? There is a reason for this, of course, and that reason is the quality of the so-called gasoline which we are using to-day. In the old days the gasoline we got was so easily and completely vaporized and carbureted that it burned in our engines without any of the nasty results mentioned above. Having the carbon removed from the cylinders either by scraping or by being burnt out with oxygen every month or so was unheard of, but to-day this constitutes the greatest trouble we have.

Why is the so-called gasoline of to-day so different from that of the old days? In the early days gasoline was that part of the crude oil which was so volatile that it could not safely be incorporated in the mixture called kerosene and was consequently, to a large extent, considered a by-product, but as the production of automobiles, motor boats and farm engines increased, it became more and more necessary to use the heavier fractions of distillation, for the refiner in trying to meet the increased demands for gasoline, found himself burdened with a correspondingly large yield of heavy distillates, such as kerosene and fuel oil, with the problem of creating a profitable market for them as well as for his gasoline. How big this problem is, can be readily understood when one realizes that there are in operation in this country, more than three million automobiles, three hundred thousand motor boats, seventy-five thousand tractors, two million farm engines, half a million motorcycles and thousands of gasoline lighting plants; besides all these, at the present time we must supply to our allies in the world war, practically all the gasoline needed for the operation of their airplanes, automobiles and trucks at the front, and now that we are in the war too, we will have to figure on taking care of the fuel requirements of the countless airplanes and trucks we are building. Is it any wonder then, that to a large extent the gasoline of to-day contains a generous proportion of the heavier distillates? In fact, it is totally different in composition from the early gasoline.

It might be interesting to note here that in 1911 there were produced 220,000,000 barrels of crude petroleum and there were made 8,500,000 barrels of gasoline, an increase of total gasoline production of 58 per cent. over that of 1910. In 1915 there were produced 290,000,000 barrels of crude and 35,100,000 barrels of gasoline, an increase of total gasoline production of 553 per cent. over 1910. From 1911 to 1915 inclusive, the production of crude petroleum increased 34 per cent., while that of gasoline about 500 per cent.

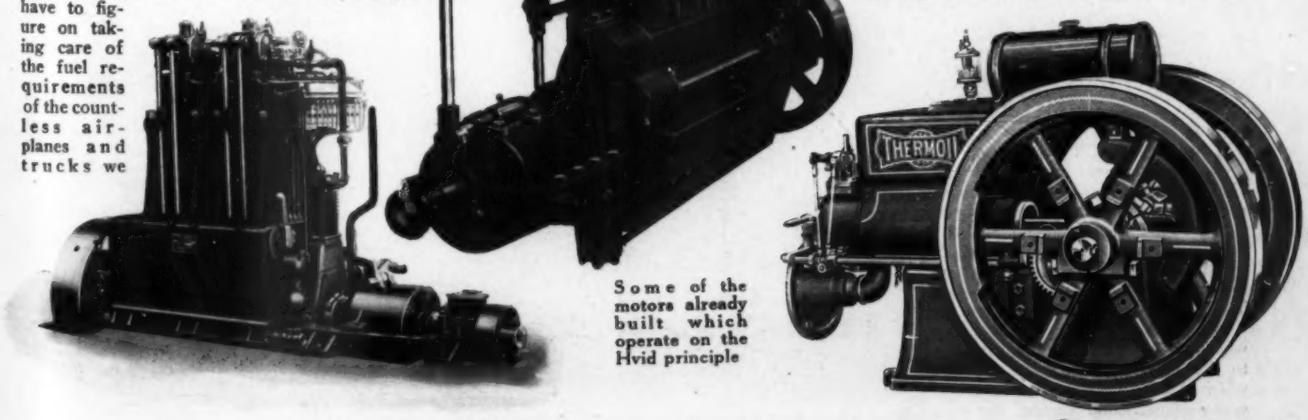
These figures will give some idea of the disproportionate increase of gasoline to crude petroleum production which means that more and more of the heavier distillates are being used in the make-up of gasoline. Yes, gasoline has absolutely changed, but carbureters have not changed in any of the essentials. In fact, our carbureters, with present-day gasoline, are little better than weighing machines which weigh out a certain amount of fuel for a given amount of air. What is the result? Only a small part of the fuel passing through the carbureter is volatilized or gasified, the balance goes to the cylinder in the form of fog, if the flow velocity in the manifold is high, due to high motor speed, or in the form of rain, if the flow velocity is low, due to slowing down the engine. Some of the fog, and practically all the rain, is not burnt, but goes out the exhaust pipe, cooks into carbon or oozes past the rings and eventually finds its way into the lubricating oil in the crank case and causes all sorts of trouble. (The best example I can think of to show that this oozing past the rings is so, is the success with which two-stroke (two-cycle) engines are lubricated by oil mixed with the fuel). I have actually known of cases where a run of no great length, has been made with a four-cycle engine just after putting clean, fresh lubricating oil in the base of reservoir, and at the end of the run nearly 10 per cent. of the oil would be found to be a sort of kerosene. Nor is the trouble with the heavier distillates in gasoline confined to carburetion and lubrication; ignition also suffers to a very considerable extent. The Bureau of Mines recently published a bulletin on the Inflammability of Mixtures of Gasoline Vapor and Air in which it is shown, that two components, which constitute nearly 15 per cent. of the gasoline of to-day, are not inflammable by an electric spark.



The Hvid principle of fuel injection into the cylinder

In another bulletin issued by the same bureau entitled, "Motor Gasoline, Properties, Laboratory Methods of Testing, and Practical Specifications," it is shown that since specific gravity is the test by which gasolines are differentiated, they vary quite widely in their chemical make up because the specific gravity test may give to a good gasoline a poor rating and to a poor gasoline, a good rating. Specific gravity gives no indication of the volatility or vaporization qualities of a gasoline, and until some standard gasoline specifications are adopted and insisted upon by the consumers, the refiners will continue to turn out whatever they think will just pass. In the light of these conditions, how can we hope to accomplish anything definite in the way of carbureter refinements?

A great deal, of course, has been done, and is being done to better the conditions brought about by the more or less gradual change from real gasoline to what we are getting now. The carbureter manufacturers have borne the brunt of the trouble and have tried hard and faithfully to devise a carbureter that will handle present-day gasolines satisfactorily, but



Some of the motors already built which operate on the Hvid principle

to quote Mr. E. N. Percy (a well-known authority and writer on carburetion), "A carbureter can only carburete to the limit of the physical and chemical laws which govern it," and Mr. H. G. Chatain (chief engineer of the General Electric Company, Erie, Pa.), says, "The design of this apparently simple piece of apparatus is indeed very complicated, so much so, that in over twenty years with innumerable intelligent investigators working on the problem, it is still, although practical, far from being a comparatively perfect piece of apparatus."

Much also has been done by designers and engineers in the way of adapting engines to poor gasoline, by shortening manifolds, eliminating sharp bends and corners, etc., but personally I don't believe the solution lies in either of the directions mentioned above, because by the time anything satisfactory is solved, the composition of our engine fuel will have changed again in the effort of the refiners to keep pace with the ever-increasing demand.

Let us rather turn our efforts toward the path of least resistance, namely; the development of those principles which will allow us to burn in our engines, the 78 per cent. of the crude oil which cannot be used in our present gasoline engines.

The first step naturally would be the development of some satisfactory method of using kerosene, because it constitutes the largest yield of the refining of crude oil, can be produced most cheaply, is the most universally distributed oil product in the world and is not at all dangerous to handle. It is absolute folly to attempt to use kerosene in standard gasoline equipment, for the forces at work in the gasoline carbureter are not suitable for turning it into an inflammable gas without the aid of heat, and since the necessary heat would have to be supplied from the combustion of this gas itself, there would always be the time lag problem to cope with, not to mention the use of gasoline or torch heat for starting.

H. M. Hvid, the inventor of the motor which bears his name

Furthermore, in order not to have to reduce the compression beyond the point necessary to secure high mean effective pressures and thermal efficiency, it is necessary to make use of water injection along with the kerosene. Unless this water is used, kerosene in a regular gasoline engine will cause a very disagreeable knock and heavy carbon deposits. There are, of course, lots of engines of both single and multi-cylinder construction running on kerosene by utilizing all the above complications, but they are far from satisfactory.

Following still the path of least resistance, we are led to the high compression principles which enable us to burn not alone kerosene, but with minor modifications, all the rest of the heavy oils without a lot of complicated paraphernalia. There are two such principles ready at hand, the Hvid and the Diesel, both of which I described in my article last January. For those who may not have read that article and who are not familiar with these principles, I will again make a brief comparison.

Both make use of the heat generated by compression to secure ignition. Both take in pure air only on the suction stroke. The introduction of the fuel, however, is accomplished in entirely different manners. The Diesel engine forces the fuel into the combustion chamber at approximately the highest point of compression, 450-510 lbs. per square

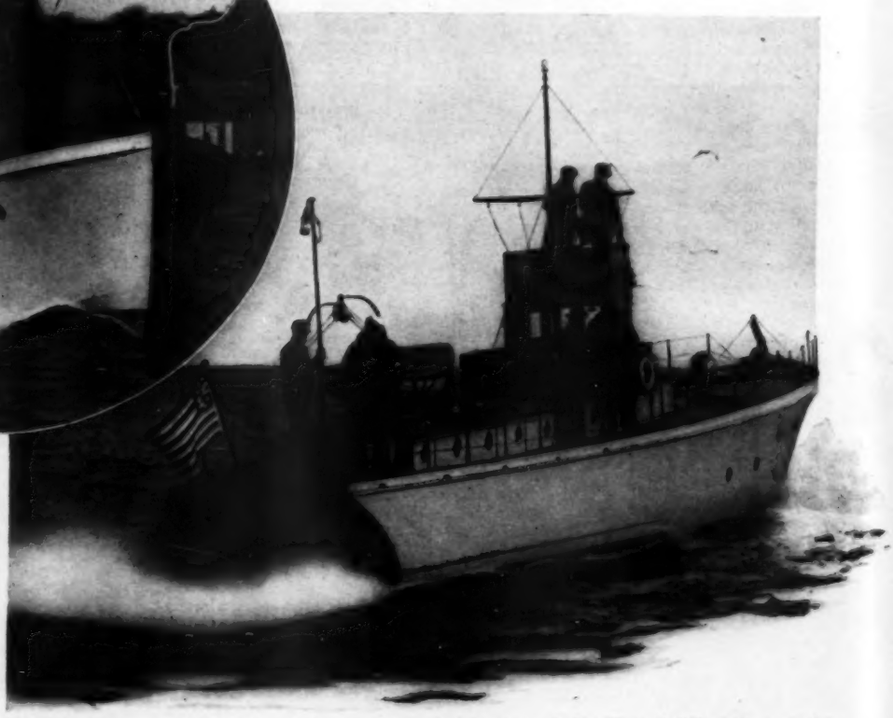
(*Continued on page* 106)

A Sixty-Foot Patrol Cruiser

A SIXTY-FOOT Patrol Cruiser, named Rose Mary, reflecting seaworthiness, strength and speed throughout, has recently been delivered by the Great Lakes Boat Building Corporation of Milwaukee, to Mr. Robert E. Hackett, also of Milwaukee, who has entered his boat in the Sectional Patrol Squadron.

Mr. Hackett's 60-footer is somewhat similar in general appearance to the 110-foot Submarine Chasers, which the Navy Department has had under construction during the past six or seven months. This design recommends itself for the reason that it permits great structural strength in the fore and aft stress members. This possibility has been seized upon by the builders of this Patrol Cruiser, and the strength accentuated very materially by means of the use of sawn frames, steam-bent ribs and battens running from stem to transom, all spaced on short centers and backing up each plank seam. A fabricated structure is built up this way, which is practically indestructible and which cannot open up in a sea.

Rose Mary is powered with two eight-cylinder Van Blercks.



Rose Mary, a 60-footer recently turned out by the Great Lakes Boat Building Corporation

Ten Years of the Marine Motor Industry

Almost Unknown a Decade Ago It Has Become One of the World's Largest Manufactories To-day—From Chaos to Nearly Perfection Is a Record to Be Proud Of

By C. B. McCuaig
Buffalo Gasolene Motor Co.

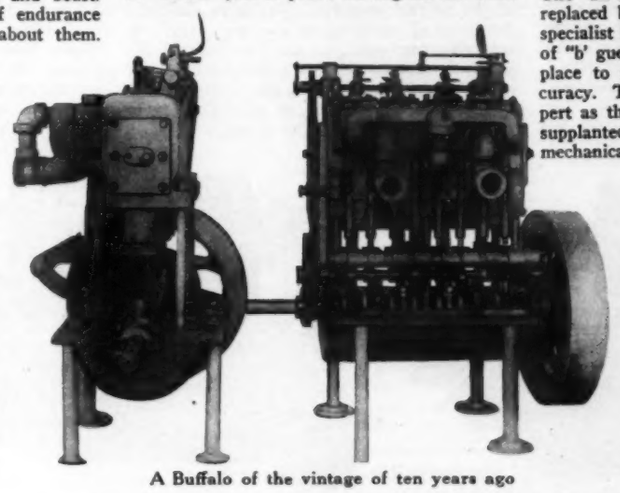
TEN years ago the Marine Engine Industry was a great deal like a "fresh" youngster just arrived at the hobble-dehoy stage. It was noisy, bumptious, inclined to be self-opinionated and overly impressed with its own importance. To-day we find a calm and chastened industry, more like a man just past adolescence. He no longer struts about bragging that he has the seat of his dad's pants for a vest. Instead he is mature, quiet, self-reliant and inclined to take both the present and the future seriously.

This simile may be a little far-fetched but it brings out the contrast I am trying to describe. A decade ago the Marine Engine Industry was noisy in more ways than one. The attitude of a good many of the manufacturers was inclined to be that of brag and boast. They planned prodigious tests of endurance for the sole purpose of telling about them. They spent thousands of dollars in the designing and building of engines which would drive a boat through the water at the then astounding speed of thirty miles an hour, only to find when it was half-completed that some other manufacturer had produced a machine which would do thirty-one miles. Most of us used our advertising space in small jobs, and all the free space the editors would stand for, to tell of the amazing exploits of our motors. I think we told the truth, but modesty was certainly not among the virtues which could be credited to us.

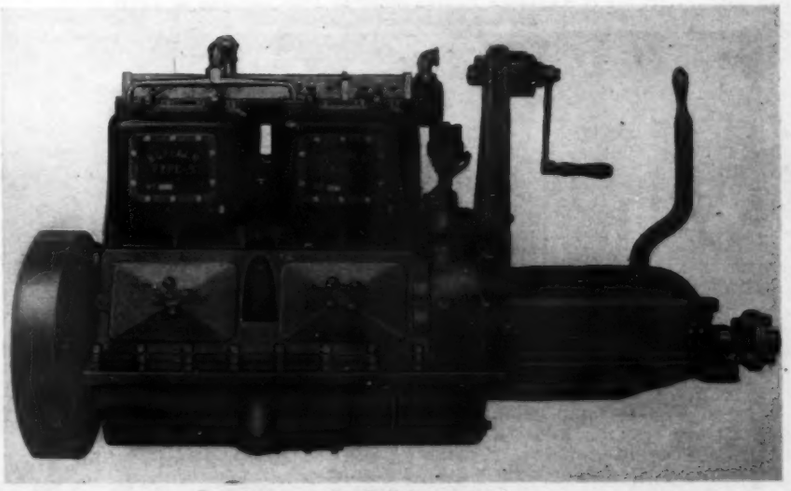
Those were the days when gas power was first on trial. Each manufacturer thought the way to make an impression was to yell louder than his competitors and use more superlatives, and strange to say, those who yelled the loudest did get the business. It was the time when the boat race or the endurance contest cut quite a figure in our young lives. The dream of each manufacturer's heart was to build an engine which would win the particular great race that happened to be on at the moment, or to give a real, "show 'em" demonstration of the fact that a picked engine of his particular make would actually run 12 hours without going through itself!

You see internal combustion engines were not taken practically at their real valuation then as they are now. As a matter of fact the public was prejudiced against them. Marine engines were the butt of more fool jokes than even Ford cars are in this generation, and it wasn't all playful banter by a long shot. A good many people honestly believed that you were never sure of getting back home on time, if at all, when you started out in a boat powered with an internal combustion engine, and let it be whispered at low breath, they weren't so very far wrong at that! Steam engines had not taken their knock-out blow in even the medium-sized units, although they had passed forever as power in the small boat field. The slow-speed, heavy-duty type of four-cycle engines was only beginning to be talked of as power for work boats, and at that, most of the talking was done by yachtsmen with a sense of humor who liked to hear old salts exclaim with none too pious indignation, that they would have none of "them durn' sea skunks" aboard their packets.

To-day the day of the sideshow and the spieler is done. The "stunts" we used to "pull" are nothing but happy memories in marine engine merchandising. No longer does the manufacturer burn up his wealth with the prodigality of an inebriated gentleman from Red Dog on "stunts" just to prove his engines are what they ought to be. Instead the public now considers the maker of gas engines a sober, truthful citizen, and takes his word for it when he tells them what his engines will do. The thousands of dollars which were spent annually on endurance tests, reliability performances, and the building of freak high-speed engines which were bested by other freak high-speed engines almost as soon as they had won one race, are now going to pay for plain, unromantic, carefully-censored advertising space in MoToR BoatinG and similar publications, with the result that the aforesaid manufacturers are now really telling their story to the world, instead of simply making a noise which served chiefly to impress themselves with the belief that they were "some punkins."



A Buffalo of the vintage of ten years ago



A present-day Buffalo power plant

This chastening of spirit, this shifting of faith from froth to substance, seems to me one of the chief outstanding changes the years have wrought, for it is reflected all through the industry, in design, in workmanship, in the choice of materials, in selling methods, even down to the minute detail of boxing engines for shipment. The erstwhile trade of marine engine building has become an exact science. The "all around man" of yester-year has been replaced by the clear-eyed, technically-trained specialist from the laboratory. The old regime of "b' guess and b' luck" technique have given place to methods of absolutely scientific accuracy. The limited skill of human hands, expert as they were, has to a large extent been supplanted by machines and instruments of mechanical precision, which cannot go wrong.

Ten years ago we were in an age of brick and mortar. To-day we are in an age of steel and concrete.

In 1907 the Marine Engine Industry had not even begun to realize the possibilities of its field. It had developed practically nothing outside of what the small pleasure boats called for. When I think back to get a clear idea of the style of engines that were built then the picture which flashes on the memory screen first is a rather balky two-cylinder, two-cycle motor of about 8 or 10 h.p. It was installed in a 22-foot open boat, and, as I remember it, used to make about five miles an hour when everything was right. And how that little beast of an engine used to smoke and backfire! It acted as "ornery" as a Rocky Mountain mule. I well remember how it would stop without warning, preferably twenty miles from home. Everyone would crank until their backs and hearts were broken. All the self-termed gas engine "experts" in the party would do their best without success, then after everyone else had given it up, the greenhorn in the party who confessedly had never seen a gas engine before, would make his way aft, tickle the little beast under its fifth rib, turn her over once and off she's go, purring the while like a pleased pussy cat.

Another picture that comes to me in this period is the engine room of a little supply boat which used to run about in Cleveland harbor. There was a four-cycle 10 h.p. engine in that boat and I never in my life saw any-

thing of its size that could make so much noise and vibration. But it ran all right, you had to admit that, and the fact was an unending source of joy to the captain, who was also chief engineer. He never got tired of pointing out to you that his engine actually ran when he wanted it to run, stopped when he shut off the gas and then started again when he wanted it to start. Yes, sir! And to prove it to you he would stop her and then start her up again, and you would stand by admiringly until the noise and vibration drove you on deck.

There were, of course, engines of larger size in the four-cycle type. I think if I have my period right they were limited to about 40 h.p. as a general rule powering cruisers of about 30 to 35 feet. On second thought I believe there were just a handful of larger boats using engines of about 100 h.p., but you could travel from coast to coast and never see one of them. You see the gas engine was still in competition with steam as power for the medium-sized yachts and cruising boats. The internal combustion engine had demonstrated its superiority in the small-boat field long before, not so much because of its own merit as because of the fact that steam engines in small units were altogether unsatisfactory. The fact that a few of the early gas engines really were unreliable did not add to the popularity of the type, but the internal combustion motor had one great advantage over steam, it was more compact and much cleaner. There was no need to use up perfectly good space with bunkers and boilers, and milady stood less chance of having her white dress ruined every time the wind shifted. These advantages and the others which there is no occasion to state in detail, finally resulted in gas engines being installed in a few of the smaller of the costly yachts which were building, and they made good. Since then it has been simply a matter of gradual growth in this field until the present time when with the exception of a few tremendously big yachts, pleasure boats which are not motor-powered are few and far between.

Of course this increased liking for gas engines on the part of yachtsmen had the effect of bringing out a larger type of engines to meet the demand. Motors up to 100 h.p. became quite common, and of late years it has become everyday practice for yacht owners to install two motors of high power turning twin screws.

The work boat is another field which has shown tremendous development. Handicapped as they were by prejudice, the manufacturers of internal combustion engines were able to prove to work-boat owners that gas power would cut their costs, which lead not only to the smaller type of work boats being powered with gas engines as they were built, but in many cases steam engines were thrown out and internal combustion engines put in. The needs of this field lead to the develoment of the slow-speed, heavy-duty type of motors, which have since become a very important factor in the industry. While these sturdy, plodding slow-speed engines—the truck horses of marine motordom—have nothing of romance or display to commend them, it is my own personal belief that they have done as much to put the industry on a firm footing as their more sensational sisters of the high-speed type. No one has doubted within the last decade at any rate, the fact that a gas-powered boat could run like a scared cat, but a few years ago there were doubts, and very grave doubts in many well-informed minds as to the ability of the internal combustion engine to withstand the strain of continued hard usage. What better argument could you use to overcome this objection than to point to a passenger boat or a car ferry powered with gas motors which was making regular trips on schedule time, or a tug boat that had never failed in a pinch and could pull the stern off a steam boat? Yes, I am very firmly of the belief that the gas-powered work boat did more than its bit to kill forever the insidious whispering to the effect that gas engines were unreliable, which for a while did so much to hold back the development of the industry.

Although its development began quite early and it was kept in the foreground by the spectacular racing events which gave to the motor-boating sport much of its popularity, the high-speed engine was a little slow in coming to the fore for every day use. True, among race boat men, and a handful of other speed demons, every conversation was punctuated with such words as "1200 r.p.m." or the prediction that some boat would be able to "go like blazes" and vague mention of a speed of forty miles an hour, but the general run of owners still clung to motors of medium speed. Then came the day of the fast runabout which still endures and probably will endure forever—of high-powered, high-speed machines for boats swift as a motor car—used not for racing but for pleasure. It was in them that the high-speed motor found its real place, and the demand was quickened by the advent of the fast express-cruiser type, which also called for motors of high speed.

One place where the internal combustion engine had a hard time making its way was among sail boat men. The sight of a put-put coming up the sound was as vinegar to their teeth and smoke to their eyes. They thought they saw in the new type of motor boat a menace to the sport of yachting as they had always known it. So it was only natural that engine makers should grin and congratulate themselves that they were getting pretty well out of the woods, when these sail boat fans began coming along one by one, and in little groups with orders for small engines as auxiliary power. They admitted that while they detested the smell of gasoline, and it was going to spoil their whole day to have one around, still it was pretty nice to have a "kicker" bolted to your keelson when the wind happened to fall. Now the number of sail boats which were equipped with auxiliary engines is surprisingly large, and the demand is not confined to the pleasure-boat field, for the

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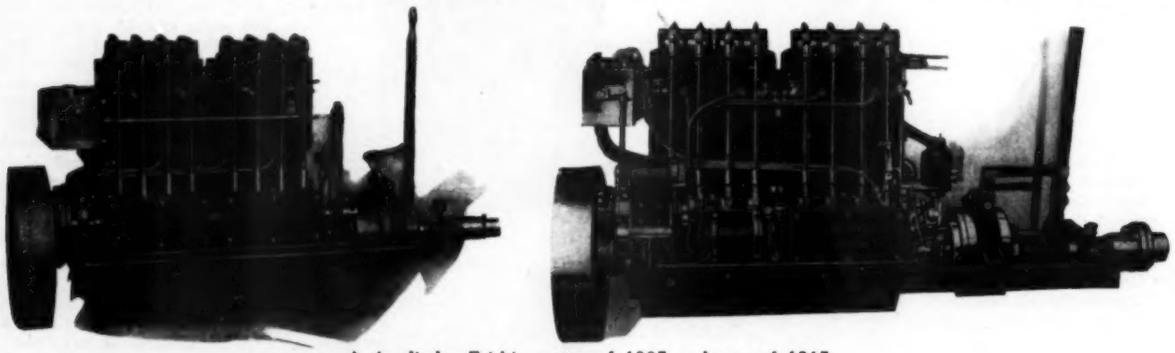
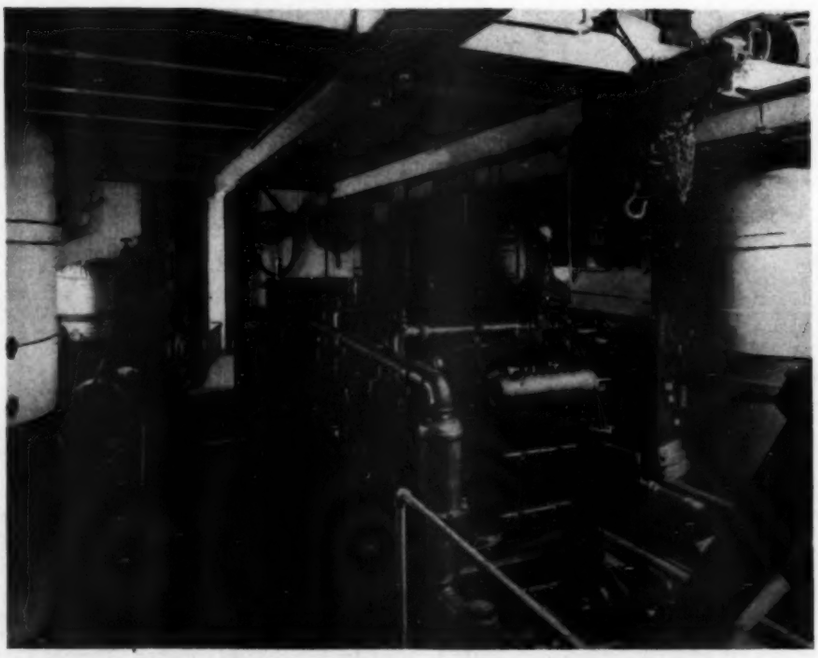


A 4-cylinder Friabie motor of 1907 and one of 1917



One of the heavy duty Buffalos installed in a motor yacht

PRIZE CONTEST IN QUESTIONS AND ANSWERS

How to Save Fuel

Conserving the Fuel Supply for Government Requirements Means Not Only Having the Entire Power Plant in Perfect Adjustment But Reducing the Season's Mileage Wherever Possible

THE PRIZE CONTEST—Answers to the First Question in the October Issue

Efficiency from Tank to Exhaust

(The Prize-Winning Answer.)

THERE are quite a number of things to be considered besides careful adjustment of the carbureter and timing of the ignition, in order to obtain the greatest possible economy in the use of gasoline.

To begin with the engine should be in good condition. Good compression is necessary. If the pistons or rings are worn so the compression leaks out easily when the engine is turned over slowly by hand, new rings and possibly new pistons should be fitted. Should the cylinders be badly worn it may be necessary to have them reground before new pistons can be properly fitted. In four-cycle engines the valves may also need "grinding in" to make them gastight. In two-cycle engines the crankcase compression should also be carefully looked after as a small leak may be the means of losing a quantity of good live gas in a day's run.

In some engines power is wasted through excessive friction. This may be caused by pistons or rings that do not fit properly, or bearings that bind. Should the engine and propeller shaft be out of alignment, power will be wasted unless a flexible coupling has been installed.

Now with the engine in good condition, the carbureter should be adjusted to furnish the leanest mixture that the engine will operate on successfully. The idea being to burn as much air and as little gasoline as is possible. In order to ignite this lean mixture an extra good hot spark will be necessary; so that the quantity and condition of the ignition apparatus must also be considered. As the lean mixture is slow burning, the spark may be advanced slightly more than when burning a richer mixture.

A warm air pipe to intake of carbureter or hot exhaust forced through a jacket around the throttle, as provided on some models will prove economical, although the revolutions may not be increased by installing such devices. The saving comes by producing a better mixture of the heavy, low-grade fuel, this requiring a smaller quantity.

There seems to be a chance for improvement in the cooling of a good many marine engines, particularly late in the season as the water becomes quite cold. As is well known, the efficiency and economy of a gasoline engine is increased by maintaining quite a high temperature of the cylinders or cylinder jackets, provided the heads do not become so hot as to cause preignition or other trouble. Now in order to obtain this comparatively high but even temperature in all parts of the cylinder, a large volume of hot or warm water, circulated rapidly is to be preferred to a smaller quantity of cold water as is usually used in marine practice.

For the marine engine, particularly when used in cold weather it would be a good plan to pipe the overflow back into the intake below the pump. Place a valve in this pipe and provide another outlet emptying into the exhaust pipe or overboard; then by regulating this value and the seacock you can bring the cylinder jackets up to the most efficient temperature regardless of how cold the water is.

It is not supposed that any one engine would be afflicted with all the ills mentioned, but it is hoped that the suggestions offered may enable some to improve their power plants in such a way as to obtain greater efficiency.

C. H. C., Saginaw, Mich.

* * *

Not All the Waste is in the Engine

ALTHOUGH Uncle Sam has not as yet placed restrictions upon the use of gasoline, such a thing is not inconceivable, in view of the enormous quantities which will be needed to feed the war machine on land, sea and in the air. Should such restrictions come to pass, it would probably mean curtailment of pleasure cruising, if not total elimination of the sport. It should therefore be the patriotic duty of every motor boatman to conserve fuel wherever possible, and thereby eliminate, or at least postpone the necessity of government action, affecting a sport the value of which, from the standpoint of national defense, is a conceded fact.

Compared with the automobile, the motor boat has a decided advantage in the conservation of fuel used for purely pleasure purposes, in that one does not, in order to enjoy his craft, have to keep continuously running. Many cool and enjoyable hours of ease can be spent away from the heat and bustle of the city, on the end of an anchor rope, in some nearby cove or inlet. This method, I would say, is the most effective way of decreasing fuel consumption, and should it prove anyway monotonous, could be varied with an occasional longer cruise.

The next in line of effectiveness, is operating whenever possible, with reduced speed. It is a well-known fact that doubling the horsepower in a given boat does not anywhere near double the speed; consequently with a partly opened throttle the cruising radius is materially increased without a very great reduction in speed. This is forcibly illustrated in the case of the Russian patrol boats described in the October issue of MoToR BoatinG, in which the cruising radius is about 500 miles at 29½ knots, and 1,000 miles at reduced speed, on one filling of the tanks. Thus twice the mileage is gotten at lower speed than at full speed.

Advantage should be taken of tides whenever possible, and runs planned accordingly. Many gallons can be saved by consulting the tide tables.

Do not operate your motor idle while standing in canal locks or at wharves. A little elbow grease, patriotically applied in restarting the motor, if you have no electric starter, will help reduce the demand for gasoline.

While the above methods will probably show the most gallons saved in a season's total, the following, while operating to a lesser degree, should not be overlooked:

Adjust the carbureter to get the correct mixture which is the minimum of gasoline to maintain perfect combustion and maximum explosive force. This adjustment is attained at that point where any further reduction in the amount of gasoline consumed shows a decrease in revolutions of the motor. A pipe or tube, conducting warm air from a sleeve around the exhaust pipe to the carbureter inlet, will effect a saving in fuel by making a more perfect vaporization of the heavy gasoline we are now getting.

Run the motor warm. Cold cylinder walls chill the explosive charge directly in contact with their surfaces, and combustion therefore does not extend throughout the entire charge, allowing unburnt gas to pass out the exhaust. The cooling water from the jackets should be too hot to bear on the hands, but not boiling, for the best motor efficiency. This can be regulated by partly closing the circulating water inlet valve until the right temperature is attained.

Do not use the spark lever to throttle down the motor. A late spark will decrease the speed of the motor, but you are using only a part of the stroke of the piston, and therefore only a part of the energy of the explosion, which procedure is wasteful in gasoline. Throttle down on the mixture and, at all speeds, keep the spark advanced as far as it will go without pounding, and you will be getting the most power from the motor, with the least consumption of gasoline. In other words, retard the spark only when starting.

Put a small pan, covered with fine wire gauze, under the carbureter, to catch all drippings. These can be used later for engine priming, and at the same time will keep the gasoline out of the bilge, where it is dangerous.

A factor in saving gasoline, is the importance of having tight valves and fittings on the fuel tank and piping. Beside their danger, leaky

Questions for the February Issue

1. What has been your experience with marine insurance as regards premiums, scope of policies, and adjustments? Have you any suggestions for the improvement of marine insurance, policies or conditions?

Suggested by G. A. C., New York City.

2. Describe and illustrate any simple home-made apparatus or device that will aid the amateur in building his own boat or any part thereof.

Suggested by W. B. M., Newburgh, N. Y.

3. Describe and illustrate if necessary, methods of restoring scored cylinders that you have found satisfactory, where no machine shop equipment such as lathe, boring mill, etc., were available.

Suggested by G. A. L., Washington, D. C.

Rules for the Contest

Answers to the questions, addressed to the Editor of MoToR BoatinG, 119 West 40th St., New York, must be (a) in our hands on or before **December 20,** (b) about 500 words long, (c) written on one side of the paper only, (d) accompanied by the senders' names and addresses. (The name will be withheld and initials or a pseudonym used if this is desired.) Questions for the next contest should reach us on or before the **20th of December.** The Editor reserves the right to make such changes and corrections in the accepted answers as he may deem necessary.

The prizes are: For each of the best *answers* to the questions above, *any article or articles* sold by an advertiser advertising in the *current issue* of MoToR BoatinG of which the advertised price does not exceed $25, or a credit of $25 *on an article* which sells for more than that amount. (*There are three prizes—one for each question—and a contestant need send in an answer to but one if he does not care to answer all three.*)

For answers which we print that do not win a prize we pay space rates.

For each of the questions selected for use in the next contest, *any article or articles* sold by an advertiser advertising in *this issue* of MoToR BoatinG, of which the advertised price does not exceed $5, or a credit of $5 *on an article* which sells for more than that amount.

All details connected with the ordering of the prizes selected by the winners must be handled by us.

PRIZE CONTEST

joints or valves are costly in wasted gasoline. I have seen a leaky plug cock that leaked two gallons a week, although the drip was scarcely perceptible—drying up almost as fast as the drop would appear. These should be carefully ground in with emery flour and oil.

Last but not least, is the inefficiency of leaking inlet and exhaust valves on four-cycle motors, main bearings that allow the escape of base compression on two-cycle motors, and worn pistons and rings in either type. All work toward waste in fuel and should be remedied for best efficiency.

W. E. M., Philadelphia, Pa.

* * *

Keep the Carbureter in Adjustment

TWO methods of gasoline economy present themselves to the motor boat owner. The first, a direct method, deals with the gasoline line from carbureter to the exhaust pipe, and the second embraces the elimination of causes that are productive of gasoline waste.

Know the workings of the carbureter used, and adjust it for the varying weather conditions as well as for the changing standards of gasoline one procures at different times.

After the motor has been running for a few minutes, and is warmed to its work, gradually cut down the feed until the motor coughs. Let it cough a while to be sure that the minimum supply has been reached, then very gradually by slight turns of the needle valve, separated by minutes, increase the feed until the motor is developing its normal horsepower.

Owing to changing atmospheric conditions, and to the poor grade of gasoline now obtainable, the above process must be followed every time the motor is started cold, if intensive gasoline economy is desired.

At night, motors do not require the same amount of gasoline as in day running.

A stove attached to the heated part of the exhaust line, and piped to the carbureter inlet, helps wonderfully in vaporizing the poorer grades of gasoline with consequent saving in fuel.

Carbureters ought not be allowed to sweat. The foregoing appliance or an exhaust water-heated check valve (two-cycle motors) will remedy matters.

The economy of gasoline does not stop at the beginning of the intake manifold. The intake valves should be free from pits and must work without the least bind. The same is true of the exhaust valves.

A frequent cleaning of the cylinders and the base will check carbon deposits. There is little need to recall here that carbon is not a lubricant, and that a badly be-carboned motor needs more gasoline to run it than a clean one.

Leaky feed pipes, if for no other reason than the imminent risk of fire, should be attended to.

The proper alignment of the shaft is important. In fact, any bind in any part of the propelling machinery is productive of gasoline waste. The friction may be little here and there, but the total of the resistances is appreciable and calls for more gasoline than would be the case if everything ran smoothly.

Engine manufacturers have spent much time in perfecting the efficiency of their motors. The size of the manifold, the speed of the mixture through it, etc., have been figured out to a nicety, all this in conjunction with the normal revolutions of the motor. Hence, any great increase or decrease in the number of revolutions from the normal, occasioned by the change of propeller, is apt to result in gasoline waste.

Running an engine idle, inability to judge the momentum of a boat in making a landing, thereby causing much backing and filling, are other causes of gasoline waste.

The spark should be a fat one. The process of combustion is not instantaneous, and the faster the mixture is ignited the less gasoline is needed to have the motor develop its full horsepower.

Lastly, top hamper will call for more gasoline. Awnings, signal masts, davits and spray cloths are desirable, but not essential, and their absence is noticeable on many of the newer small boats. A hard-towing tender comes under the ban, too. With boats of the launch type, the trim in running will result in the loss of engine efficiency and consequent gasoline waste.

J. E. M., New London, Conn.

* * *

Do Not Over-Power Your Boat

WITH motor boats, aeroplanes, and motor cars playing so vital a part in the World War the supply of gasoline is bound to be an important factor in the final result. Like other war supplies of great importance the supply of gasoline should be conserved with greatest care, and it is the duty of every motor boatman to see that no charge of waste can be laid at his door.

Now the modern gasoline engine is a highly developed machine, and in the later models there is little that the operator can do to improve the mileage except, of course, to see that the adjustments are correct. The only source of economy for the man who owns an engine of the latest type is to do less running. Instead of long cruises he must make his trips to some point of interest and spend a larger part of his time at anchor. In other words, he must learn to enjoy his boat more with the switch thrown off.

Those who are contemplating the purchase of a new power plant should guard against over-powering. Over-powering means a high rate of fuel consumption, and usually the extra speed obtained is nowhere in proportion to the extra fuel burned.

The average motor boat, not designed for speed, can be driven economically only up to a certain speed, beyond which increasing the power has very little effect on the speed, but churns up a beautiful wake, and with most types causes the boat to squat.

For the man who owns an engine of an earlier vintage there are several things he should try in his pursuit of increased mileage. First he should write to the makers and find out whether or not his model could be fitted with a kerosene attachment. If practical it should be adopted at once.

If an engine is using cold air a piece of flexible metal hose should be installed connecting the air-intake of the carburetor with either the base of the engine or a heat-jacket on the exhaust line, thus supplying the mixture warm air.

By using the throttle in conjunction with the carbureter adjustments try to find the economical speed of the outfit. That is, the speed at which the engine should turn to drive the boat over a given distance with the lowest fuel consumption. There is usually a point somewhat lower than top speed, where, if time is not of vital importance, there is a saving.

There are certain patented suction valves to be placed in the intake manifold which work satisfactorily, but on an engine running pretty much at one speed a valve in the intake manifold which can be operated from the controls is practical.

Make a few experiments, noting carefully their results, and you may save yourself something toward a Liberty Bond and some gasoline for Uncle Sam.

W. H. F., South Freeport, Me.

Care and Judgment Well Repaid

KNOWING that the price of gasoline is high, and agreeing with the government officials that it should be conserved, it is to our own advantage, financially, and to our own interests, patriotically, to obtain the maximum efficiency from the gasoline we consume; and by exercising a little care and judgment in the operation of our engines, we can reduce our gasoline consumption to a great extent, thereby lowering our fuel cost and also contributing in an effective way to the winning of the war.

The three ways in which the greatest saving of gasoline can be made are—given in order of their importance—the carbureter adjustment, the ignition timing and the motor temperature.

Carbureter Adjustment.—The highest mixture efficiency is obtained when running on the leanest mixture that the motor will take without skipping or backfiring. When operating on a rich mixture the combustion is sluggish and incomplete, large amounts of carbon monoxide and hydrogen are blown out of the exhaust—representing wasted fuel and lost power; with a lean mixture rapid and complete combustion takes place, the amount of power delivered being greatly increased.

Correct Ignition Timing.—When running with a retarded spark, a full charge is drawn into the cylinder, but it does not deliver the maximum power because the compression has decreased before the explosion takes place; with the spark advanced, complete combustion is taking place just as the piston starts down on the power stroke and the full amount of power is thus delivered to the piston and transmitted to the shaft; should the spark be advanced still further, the engine commences to knock using up the power in the strain on the bearings. Therefore, advance your spark almost to the point where the engine begins to knock; to obtain the best ignition results, the spark should be advanced as the speed increases.

Motor Temperature.—Cut down the amount of cooling water until the motor runs quite warm. This will diminish the quantity of fuel required and make your motor run far better.

I am adding more hints of lesser importance that are nevertheless good to know.

On a high speed engine, use an auxiliary air intake in the manifold.

A hot air duct from either the exhaust pipe or the exhaust manifold to the carbureter improves the vaporization.

See that your engine is in good condition; valves ground and timed correctly; piston rings tight; combustion chamber free from carbon; no loss of compression by leakage; exhaust pipe and muffler clear of carbon; pipe line as straight as possible; and, in two-cycle motors, bearings tight and no leaks around crankcase.

Do not run motor idle too long at wharves, it takes gasoline.

If piston rings are worn equip with new rings.

If possible use kerosene: it is cheaper and required less by the Government.

Last but not least, use an efficient propeller, anything over 30 per cent. slip can be improved upon.

If the above precautions are taken, you will get the maximum miles per gallon possible with your type of boat.

A. T. G., Dover, N. H.

PRIZE CONTEST

An Ice-Box for a Cruiser

One of the Most Important Items of Equipment in Order to Thoroughly Enjoy Cruising is a Well-Built and Economical Ice-Box

THE PRIZE CONTEST—Answers to the Second Question in the October Issue

A Well-Arranged Box

(The Prize-Winning Answer)

THE construction outlined here is simple and inexpensive, and such a refrigerator will afford the owner of a small cruiser all the comforts of an economical, sanitary and convenient food locker.

No dimensions are assigned the various parts, since the available space in each boat is different from that in any other and also the requirements as to the amount of space needed in the box by boat owners will vary in each case.

The shape of the boat will largely determine the exact method of framing and fastening to the hull. In general, however, proceed as follows: Build the back and sides in place, of ½-inch tongue and groove material. Line the interior with asbestos paper, neatly laid, and secure it with 1-inch by 1-inch strips, well fastened. These strips will serve as nailing strips for the interior lining, thus leaving a clear 1-inch air space for insulation. For the interior lining use matched material ½-inch thick, in wide strips with joints neatly fitted and laid against a second thickness of asbestos paper. Make the shelves also of ½-inch material, in two or three widths for each shelf, with spaces between so as to allow free circulation of air. The construction of the two doors is shown in the sketches. Fasten the door to the ice compartment with flush hinges, or it may simply be lifted out by means of a flush ring. The door to the food compartment is hung on standard ice-box hinges and held closed with an ice-box latch. In the ice chamber secure a deep pan made up of zinc or galvanized sheet metal with drain leading outboard just below the waterline. Have this pan enough smaller than the ice compartment so as to allow about two inches of space over the top and along the back side of the pan for the circulation of air.

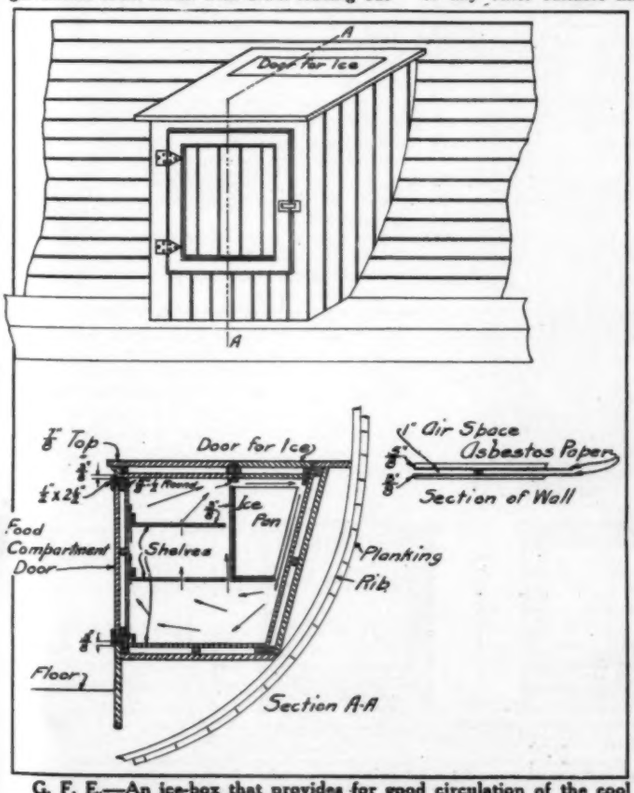
Use galvanized nails and screws for all fastenings. The lumber used may be almost anything other than pine. Spruce is excellent. Pine is likely to give the food an unpleasant flavor. Shellac each piece of lumber in the whole construction to prevent the odor of the wood from penetrating the food. Plane and sandpaper each piece that is to make up the interior surface before fastening in place, then putty all seams and nail holes, and when all is done give the interior three or four coats of flat white refrigerator paint, lightly sanded between coats, and finally one or two coats of refrigerator enamel. The top may be used as a work table and the sides and top are to be painted or varnished to match other woodwork of the boat.

The insulation suggested is easily obtained and entirely satisfactory. However, the air space might be packed with granulated or solid cork, dried eel-grass, or any other suitable insulating material. Arrange the shelves to accommodate milk bottles. Two doors to the food compartment may be substituted for the one shown. Leave ample clearance around the doors so that they swing clear, yet not more than is needed for this purpose.

Should the space available in the boat not be wide enough for the arrangement shown, the ice pan can be placed to one side instead of in back of the food compartment as illustrated.

Whatever arrangement is used for the interior of the box, care should be taken to see that ample provisions are made for the air to circulate over the ice and through the food compartments.

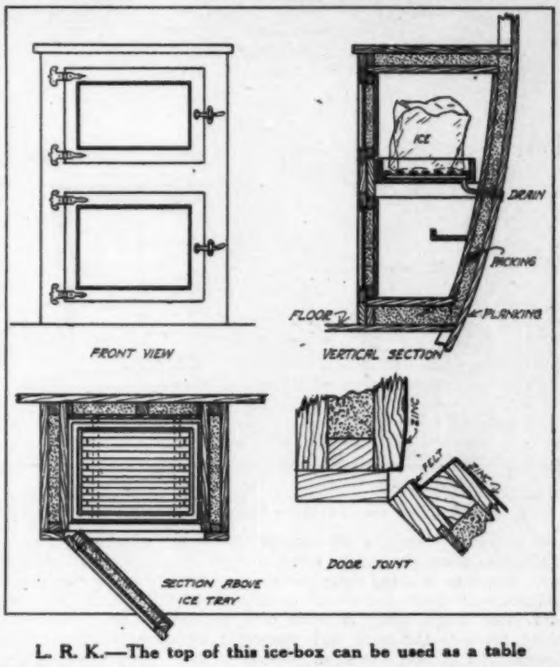
G. F. E.,
Burlington, Vt.



G. F. E.—An ice-box that provides for good circulation of the cool air and with ample space for food

A Combination Ice-Box and Table

PROBABLY the most convenient type of refrigerator for a small cruiser is one built in as part of the galley, utilizing the top for a working table, or as a support for a dish closet, etc. The one illustrated is fairly easy to put up; the hardest part to make being the front frame with the doors. This is made from inch and a quarter stock with mortise and tenon joints, and can be ordered from any cabinet maker or mill if you do not care to tackle it yourself.



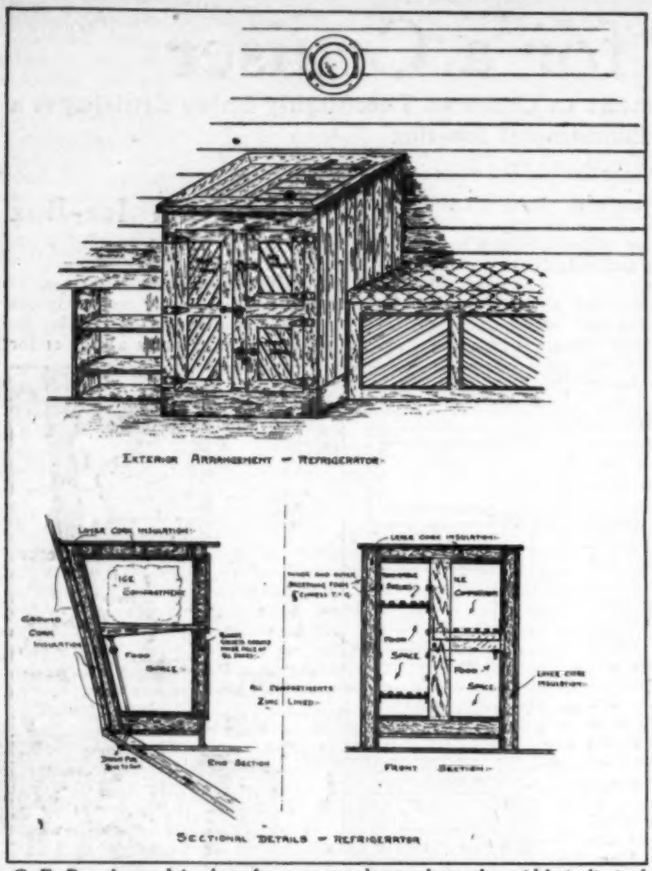
L. R. K.—The top of this ice-box can be used as a table

To the back of this frame nail strips about an inch and a half wide, and to the edges of these nail the outside and inside boards, running back to the planking or sheathing of the hull where they are nailed to similar strips. This leaves a space between the boards which is to be packed with mineral wool (not steel wool) of about an inch and a half at the sides and top, and more at the bottom. A similar space is provided at the back against the hull. Put the outside boards on first and line them with a rosin sized paper to prevent the packing from falling through any crack that may open up. Mineral wool is given above as a packing, but if not available, ground or sheet cork, magnesia, asbestos, etc., can be substituted, remembering that it is the packing that saves the ice.

To the inside of the doors another frame is fastened about half an inch smaller than the door all around. Line this space with paper, pack with mineral wool, and cover with some half-inch boards. The door opening and the edges of the doors should be beveled to make a snug fit. The entire interior of the box and doors is lined with sheet zinc, tacked on, as it is not required to have these water-tight. (See door joint.)

The ice-tray is placed between the doors, supported by two beams, so that there is about

PRIZE CONTEST



C. E. B.—A good ice-box for a motor boat where the width is limited

an ice-box greater than 36 inches long by 21 inches wide by 48 inches high is uncalled for. The principle of design should be in accordance with the sketch herewith; that is, having the ice compartment in the upper part of the box at one side and food spaces to the side and beneath the ice compartment. Such an arrangement allows for the proper circulation of air chilled by the ice.

The method of construction is almost too simple to require detailed instructions, yet the following building suggestions together with reference to the sketches are all that is needed to successfully carry out the work.

First of all the refrigerator proper is nothing more than a double-walled box with about 2 or 2½ inches of layer or sheet cork insulation between the outer and inner walls. The sheet cork comes in long, narrow strips as a rule and can be purchased through almost any of the various supply houses advertising in MoToR BoatinG. The walls or sheathing (both inner and outer) should be of ⅜-inch matched boards (tongued and grooved) and preferably of first-grade cypress. All seams and butts should be neatly made and waterproof glue or heavy shellac can be used to advantage between surfaces in order to insure air-tight joints.

The different compartments should also be neatly lined with No. 22-gauge sheet zinc fastened with round-head tacks to the sheathing. The drip pan is a job for the tinsmith and can also be made from No. 22-gauge zinc soldered water-tight and fitted with a brass nipple (as shown) to receive the union on the drain pipe. The shelves for food should be made from oak slats nailed to cross pieces which rest on cleats fastened along the sides of the sheathing, thus rendering the shelves removable for cleaning or adjustable to various heights.

The doors should be very carefully fitted and hung on heavy hinges. The inner face of the doors should be packed all around with sheet-rubber gaskets to prevent leakage of the cold air.

With the carpenter work finished, the box should be given two good coats of white marine enamel on the inside and allowed to dry thoroughly then sand-papered on the outside and finished up to be in keeping with the rest of the cabin interior. C. E. B., Fall River, Mass.

half an inch clearance all around the tray. This is to allow the proper circulation of the air. The tray is about three inches deep, and is lined with sheet zinc turned over the edges and made water-tight. A drain pipe is provided towards the back and connected outboard. To protect the zinc, provide a grid made from oak strips, and that is removable for cleaning.

The interior wood parts covered with zinc are white pine, and the outside to match the cabin finish. The doors are fitted with the regular ice-box hinges and clamp latches. Fasten some thick felt tape to the half-inch flat edge of the doors to make a fairly tight fit when clamped shut. Drinking water may be kept in the ice compartment in a jug, but if running water is available, pipe it to a coil of lead pipe (about three-eighths of an inch inside diameter suspended between the cross beams under the ice-tray. Have this connected to a faucet on the outside of the box. Use about thirty feet of this pipe to give a good capacity. Keep the body of the coil below the level of the inlet to the coil, or the cold water will circulate back to the supply tank to some extent.

Provide a shelf in the lower compartment, with holes and catches to securely hold the milk bottles and other regular occupants of the refrigerator.

L. R. K., Philadelphia, Pa.

* * *

A Very Roomy Ice-Box

THE accompanying sketches illustrate the arrangement and make clear the construction of an inexpensive yet efficient refrigerator for use on a small cruiser. Of course, the general dimensions will be governed for the most part by the amount of space at hand, yet for a majority of small cruisers

* * *

An Ice-Box for the Cockpit

THE ice-box shown in the drawing will be built this winter in my cruiser and will be placed in the cockpit behind the steering wheel where it will also serve as a steering seat.

I have decided to keep ice and drinking water separate as the experience of the last summer has indicated that pure ice fit for drinking purposes cannot always be gotten when on a cruise, and for that reason will install a tank higher than the ice-box, and pipe drinking water through a coil of pipe under the grating inside the ice-box. The ice-box will also serve as a table when there are but two or three at meals. The box will be constructed of a framing of ⅞-inch thick oak, the inner edges rabbeted out to receive a paneling of ⅜-inch thick tongue-and-grooved yellow pine wainscoting with V-shaped cut beadings. The joints between the framing members will be mortised and tenoned as shown in the sketch.

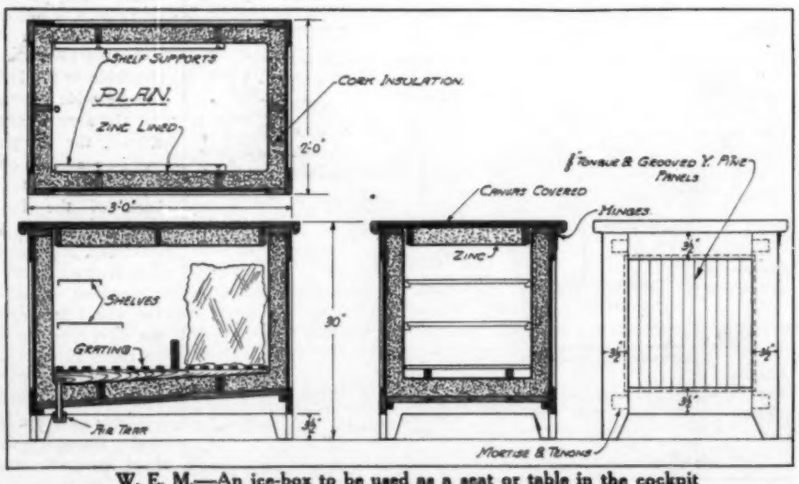
The bottom will be floored with ⅞-inch thick tongue-and-grooved yellow pine boards, resting on nailing strips nailed to the inside of the framing.

The lid will be plain yellow pine ⅞-inch thick, nailed to three battens on edge which also serve to hold the insulation in place. Similar pieces should be run vertically as shown in the plan view to hold both the cork insulation and the zinc lining of the ice-box, on the four vertical sides of the box.

The bottom I shall make sloping one-inch deeper on one side to shed water to the drain outlet.

The box is now ready for the insulation. For this the cork from old, worn-out life pre-

(*Continued on page 74*)



W. E. M.—An ice-box to be used as a seat or table in the cockpit

Standardization, the Watch-Dog of the Future

One Reason Why Many Concerns in the Industry Have Become Successful—Some of the Manufacturers of Marine Motors and Boats Who Believe in Specializing

By R. W. Wadman

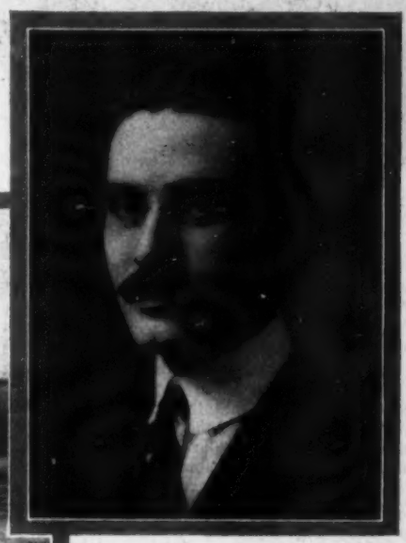
EVERY worth-while industry has to pass through a formative period, a period in which the manufacturers in that industry are casting around to discover what the public wants. In this formative period each manufacturer probably is making a different size or type, in many cases several different sizes and types, until gradually individual manufacturers discover that the public is interested in one particular model to a large enough extent to warrant his concentrating his resources and capacity on that one type. Then he begins to standardize and from that time the industry becomes a real business and rapidly begins to grow and expand.

That is what has happened to the boat and engine business. It has been passing through a formative period, when each manufacturer was building many different types and sizes of boats and engines, practically building to the individual demand, which meant limited output, high overhead, excessive prices and small profits. During the past ten years hundreds of firms have started in the boat and engine industry and have dropped out because it proved an unprofitable business. Possibly twenty-five per cent. of the concerns that started in the industry ten years ago are still engaged in it, probably considerably less than that. It has been an industry of high mortality because it wasn't a standardized industry, neither the output nor the demand was stable or permanent. But it was largely the manufacturers' own fault that it wasn't more stabilized. The manufacturers didn't know what to build and the buyer didn't know what he wanted. It wasn't until the manufacturer made an intensive study of his market, averaged up the requirements of the buyer and then designed and built a product to meet that average requirement, that any builder made much profit out of the industry.

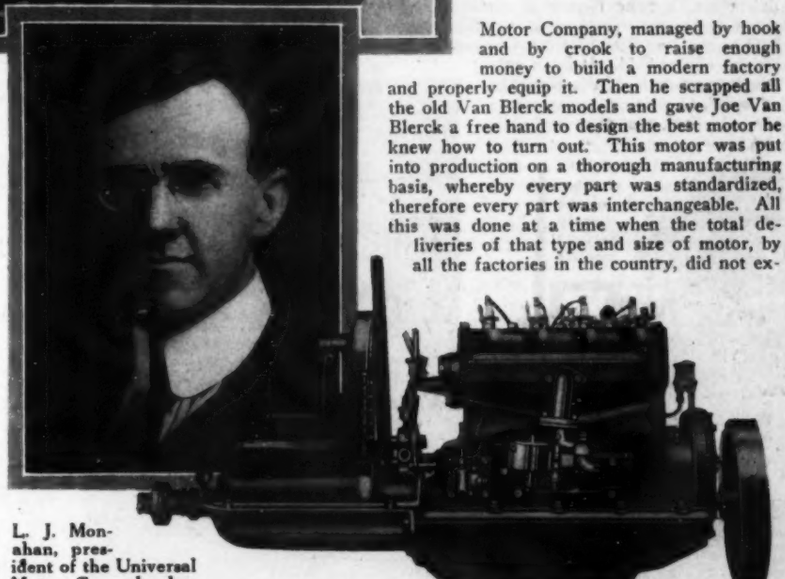
An Albany standardized express cruiser

A forerunner of the Universal motor of today

Take a concrete example. The Van Blerck Motor Company had its birth in the woodshed at the back of Joe Van Blerck's somewhat humble residence in Detroit. He first built a small single-cylinder motor, then his friends persuaded him to build a two-cylinder engine, then he went to a four-cylinder, to a six, to an eight and then a twelve-cylinder of the same cylinder size. Then, still at his friends' request, he built a four and six-cylinder motor in a little larger size. Practically building a different motor for each customer. Even two motors of the same cylinder size and number of cylinders were not very much alike. It was impossible to interchange parts to a very great extent. It was a work of art to get parts to replace those worn out or broken. And each year he was in business his overhead went up and up, his investment in patterns, tools, jigs, etc., simply ate up every bit of profit he made on his sales. His business increased year by year, yes, but not so rapidly as his losses. Some of his engines worked well, others didn't, simply because it was impossible to be certain about them when each motor was built separately, often without blueprints, let alone complete jigs, etc. In 1907 it really looked as if it were an impossibility to run an engine business at a profit, especially engines of a high-speed, high-powered type. About this time came C. B. Page, who took hold of the Van Blerck proposition. He had a dream that there was a latent demand for a good high-speed motor. He had the dream that the public could be educated to buy one certain type of motor. He reorganized the Van Blerck Motor Company, managed by hook and by crook to raise enough money to build a modern factory and properly equip it. Then he scrapped all the old Van Blerck models and gave Joe Van Blerck a free hand to design the best motor he knew how to turn out. This motor was put into production on a thorough manufacturing basis, whereby every part was standardized, therefore every part was interchangeable. All this was done at a time when the total deliveries of that type and size of motor, by all the factories in the country, did not exceed forty engines a year. It took nerve. But the Van Blerck people went ahead and started to produce this standardized motor in a four-six- and eight-cylinder unit of the same cylinder size and they backed it up with a live adver-



L. L. Tripp, president of the Albany Boat Corp., a concern which specializes in standardized runabouts and express cruisers



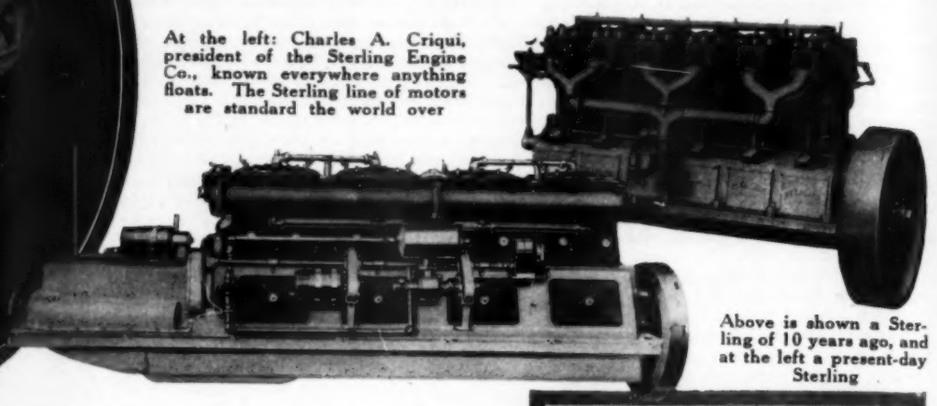
L. J. Monahan, president of the Universal Motor Co., who has been in the marine engine industry since 1890 and is responsible for the development of the 9-12 h.p. Universal motor, which is strictly a standardized model

The 9-12 h.p. Universal motor, the only size manufactured by its builders

ity on the production of just one thing, whereby that thing is built better, is built for less money and is sold for less money.

Another striking example of the evolution of a marine engine factory is the Sterling Engine Company. The Sterling Engine Company, in days gone by, practically set out to build a size and type of motor to meet every demand of the motor boat owner, either for pleasure or commercial purposes. As many as eighteen different models have been offered by this factory at one time.

At the left: Charles A. Criqui, president of the Sterling Engine Co., known everywhere anything floats. The Sterling line of motors are standard the world over



Above is shown a Sterling of 10 years ago, and at the left a present-day Sterling

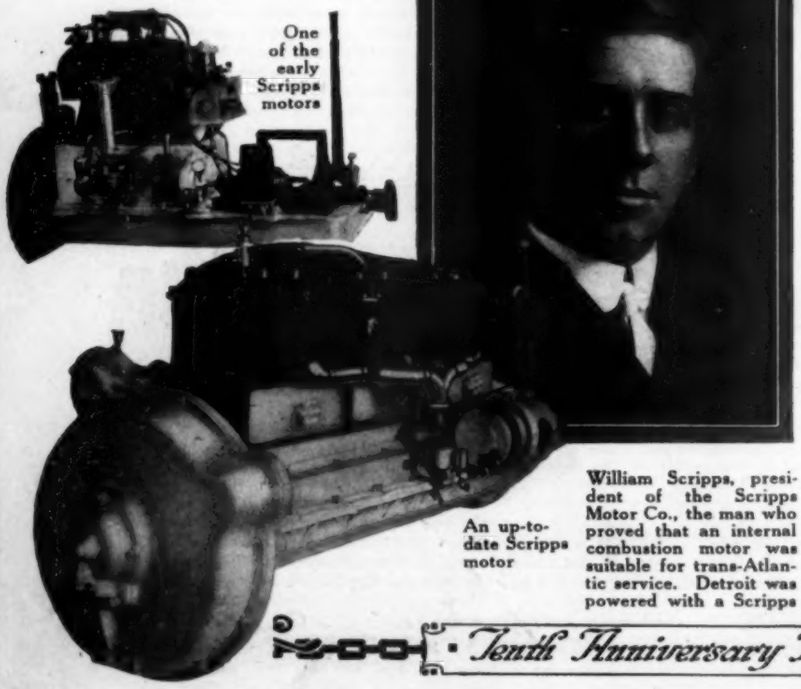
tising and publicity campaign that set out to educate the public to the benefits of that type and size of motor and the pleasure to be derived from the use of that motor in express cruisers. In other words, they built something that approximated the requirements of the public and then sold the public on the idea. It is history covering the success that attended this motor. The public took to it and bought it, bought it in large enough quantities to maintain the Van Blerck factory at full time and, sometimes, overtime. The success of this motor and the idea back of it brought the vogue of the express cruiser into being and the Van Blerck people preached the advantages of the express cruiser, as by so doing they created a market for high-speed motors. Their business more than doubled the first year of this plant, the next year it doubled itself again, and to-day everybody knows the position held by the Van Blerck Motor Company in the marine engine field. It is an outstanding example of the efficiency of standardization. A concentration of effort, resources and ability on the production of just one thing, whereby that thing is built better, is built for less money and is sold for less money.

During the last few years that factory has gradually eliminated many of the sizes until to-day a vast proportion of their output is concentrated on one cylinder size built in three cylinder units; they have concentrated their production and their advertising on this one size. To-day the Sterling Model F is known wherever American marine engines are in use. It is another splendid example of the possibilities wrapped up in the standardization idea.

The Duesenberg Motors Corporation, an outgrowth of the old Loew-Victor Engine Company, is a striking example of the success of the standardization idea as applied to the marine engine industry. The Loew-Victor Engine Company sold six or eight different sizes of motors, their business was comparatively small, as likewise were their profits. They dreamed the dream of a big, high-speed, standardized motor. They made the dream a reality. To-day the Duesenberg Motors Corporation build only two sizes of motors, one a six-cylinder and the other an eight-cylinder, both 6¾ x 7¼ inches, for the marine field, both motors built on definite standardized lines and to definite specifications. To-day their volume of business in one month equals that of the old Loew-Victor Company for twelve months, and the end is not yet.

The standardized Kermath motor

"Jack" Farr, president of the Kermath Mfg. Co.



One of the early Scripps motors

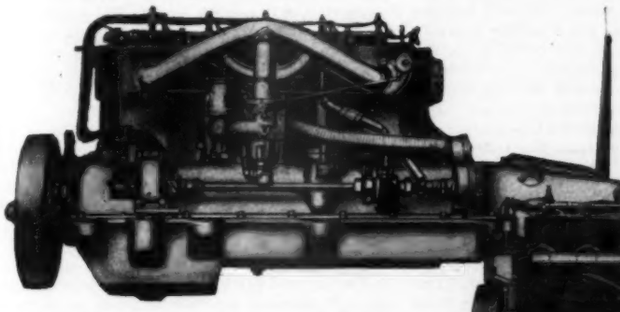
An up-to-date Scripps motor

William Scripps, president of the Scripps Motor Co., the man who proved that an internal combustion motor was suitable for trans-Atlantic service. Detroit was powered with a Scripps

In the boat industry the same trend is noticeable. We have the example of the St. Louis Yacht & Engine Company, the Milwaukee Yacht & Boat Company, now both merged into the Great Lakes Boat Building Corporation of Milwaukee. The St. Louis concern started out to build standardized boats, but they offered quite a list of boats to choose from; in fact, it was practically a built-to-order proposition, as the customers had too many choices. They did a fair business, enough to convince themselves of two things: first, there was no money in built-to-order boats; second, the public could be sold standardized boats. Their facilities for manufacturing boats were limited at St. Louis, so they looked around for a better location. They eventually landed on the old Milwaukee Yacht & Boat Company, a concern with a splendid factory, good equipment but no business. The Milwaukee Yacht & Boat Company had started out with everything in their favor. Spent a lot of money ad-

vertising, some more money in traveling expenses, some more money in building boats at a guess-work estimate and then hung out the S. O. S. sign, mainly because they couldn't make up their mind what the public wanted and the dear public didn't take the time to tell them, hence frittered away their birthright in procrastination and experiments.

The St. Louis concern came up to Milwaukee, organized themselves into the Great Lakes Boat Building Corporation and forthwith started into the boat business just as if it were a regular business. They had analyzed the possible market and found that and why the reader should buy their boat. The publicity followed the same line; it talked just this one boat and its many advantages. And the result was that—a total of three boats of this type were sold in 1916 and so far, this year, a total of thirty-three boats have been sold, all at very satisfactory prices. Despite the fact that this plant is located in Milwaukee, a large number of these boats have been sold and delivered to people living on the Atlantic seaboard. The public really will buy a standardized boat; they like the idea of being able to get prompt deliveries, of knowing exactly what they



At the left is a 1917 Van Blerck and below is a much older model of the same make

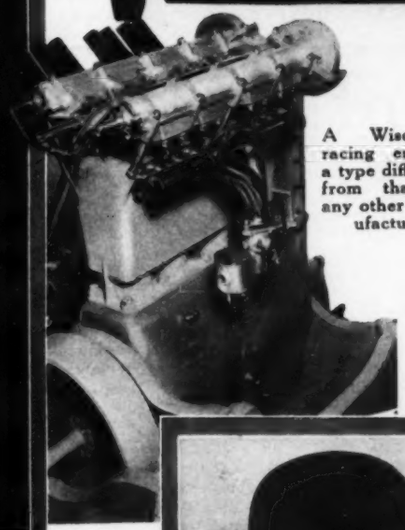
"Joe" Van Blerck, the father of the high-speed marine motor

are going to get and of having a boat turned over to them completely equipped. The Great Lakes Boat Building Corporation ignored the precedents of the boat-building industry and ran their business on ordinary business methods and really have made quite a success of it.

The Albany Boat Corporation, of Watervliet, N. Y., an outgrowth of the Hacker Boat Company of Albany, is another shining example of the success of standardization. First, they started on built-to-order boats, did quite a business but couldn't seem to keep the balance on the right side of the book. Then they started on the standardized boat as somewhat of a side line, still their balance wasn't an entire success. Then they took their nerve in both hands and concentrated on standardized boats. Their total production trebled without increasing floor space and it is a very comfortable feeling to be the owner of stock in the Albany Boat Corporation at this minute.

In other words, the boat and engine business is becoming a regular industry, it is growing out of its swaddling clothes of haphazard manufacturing methods and lining itself up with the automobile industry, the shoe industry, the steel industry, etc.

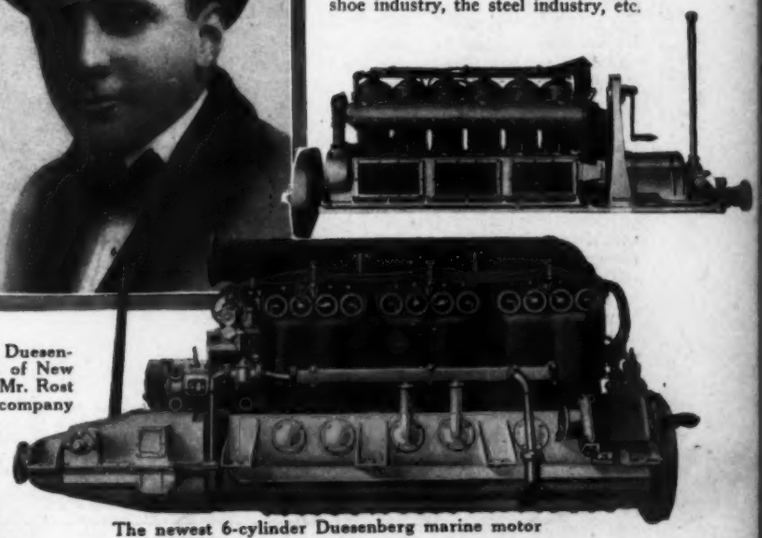
Wm. H. Johns, president of the Wisconsin Motor Mfg. Co., one of the champions of the cause of standardization



A Wisconsin racing engine, a type different from that of any other manufacture

the public was really interested in express cruisers of a definite size and type. They had built two 40-foot cruisers and one 50-foot cruiser of what they called the military type and all three of these boats had been very successful. Consequently they got out a complete standardized set of specifications for a 40-foot and 50-foot standardized military type express cruiser and stated that they were going to concentrate their resources and ability on those two boats. Then they backed up that statement by putting a production order through the shop for four of the 40-footers and two of the 50-footers. In the meantime they had called into a conference a man with some considerable experience in the advertising and selling end of the industry, and worked out a publicity and advertising campaign and then consistently and persistently adhered to that campaign. A series of advertisements were prepared offering these two boats, giving definite data and quoting prices. These advertisements were not just statements "we make boats, please buy one," but were definite statements of what they had to offer

"Nick" Rost of the Duesenberg Motors Corp. of New York City. Since Mr. Rost has been with the company he has standardized their line of marine motors



The newest 6-cylinder Duesenberg marine motor

Marine Engine Lubrication

By L. L. Niedrach
New York District Manager, Indian Refining Co.

MUCH has been written pertaining to proper lubrication of marine engines and a determined effort seems to have been made by oil experts to surround this class of lubrication with a veil of mystery and becloud the issue. Their purpose has been to create a market for a specific oil, and their recommendations usually carry a threat that unless the oil they recommend is adopted the consumer will find himself with a ruined engine.

As a matter of fact the first requisite of a proper marine-engine lubricant is an oil with a medium flash and fire test, and a fluidity or viscosity of approximately 200 seconds at a temperature of 70° Fahrenheit. The oil should be filtered to remove impurities in the form of free substances and floating carbon. This filtering, however, is the work of the refiner and not the consumer.

It is wise to purchase advertised branded oils, not because of the recommendation of oil experts or oil charts, but for the reason that the manufacturers of these oils refine an oil of the character described above; and to maintain the brand the oil sold is generally uniform in quality.

Marine motors are internal combustion engines, made with one, two, three, four, six and eight cylinders of two- and four-stroke cycle types. The task of a marine engine from a lubrication standpoint is much lighter than that of an automobile motor for the reason that there is less retarding friction, less vibration and a better cooling system. Marine engines pick up fresh moving water under pressure which circulates through the cylinder jackets and is immediately discharged. The temperature of this water is usually several degrees lower than the temperature of the air. For this reason the temperature of a marine engine is relatively lower than the temperature at which an automobile engine operates. For the same reason lubrication is less complex and a much lighter oil may be used, thus reducing the danger of carbon deposit.

The lubricating system is by splash, gravity or force-feed. An engine using force-feed lubrication requires a slightly heavier oil. The oil being fed under pressure, the heavier body eliminates the hazard of getting too much oil. Quite often in two-cycle motors the oil is fed with the gasoline. In this practice a medium-bodied oil should be used, and the proportion is one pint of oil to five gallons of gasoline. A thorough mixture should be made before filling the tank.

On heavy-duty engines, hot bulb oil engines and specially constructed motors for big tonnage, these suggestions do not apply. Engines of this type require a heavy oil with flash and fire above 500° and fluidity or viscosity of more than 300 seconds at 70° Fahrenheit.

Grease cups and shaft lubrication in the stuffing box require a medium-weight grease, rich in oily fluid to thoroughly lubricate and keep out the water.

Starting with the above suggestions, perfect lubrication is a matter of common sense and careful attention on the part of the operator. As parts become worn and piston clearance increases, a slightly heavier oil should be used to take up this clearance and prevent lost compression and carbonization of the oil on the top of the piston head.

Pay a good price for your oil, purchase an oil of national reputation from a reliable dealer, watch your motor, use your head and you will obtain better lubrication than by following prepared charts and suggestions from engine manufacturers and advice from so-called oil engineers.

Ten Years of MoToR BoatinG

(*Continued from page 9*)

they claimed developed a speed of 46.5 m.p.h. At the same time W. J. Deed predicted that a speed of 40 m.p.h. would be attained at the next International Race, but this prediction was far from being fulfilled.

At this early date, 1910, the Seattle Yacht Club members conceived the idea of a fleet of motor boats, together with their crews, to be at the disposal and under the direction of the Navy Department in much the same manner as the Naval Militia, and to be given suitable training for performing patrol and scout duty in time of war. This idea was indorsed by the assistant secretary of the Navy, who appointed Lieutenant Commander A. H. Robertson, then at the Bremerton Navy Yard, to render all assistance in his power. In return for volunteering their boats and their services they wished to be exempt from inspection, customhouse taxes, etc. This appears to have been the origin of the motor boat patrol idea in this country.

Probably the longest ocean race ever held was sailed in May 1910, from Philadelphia to Havana, and was won by Berneyo, a 60-footer, on rating, the best time being made by Caliph, also a 60-footer, 149 hours, 21 minutes. The Bermuda Race was won by Eronel, a 45-footer powered with a 25 h.p. engine.

The new Federal laws relative to the operation and equipment of motor boats went into effect on July 9, 1910, and provided the first satisfactory basis as to what equipment the various sizes of motor boats should carry, and also an efficient and uniform method of inspection.

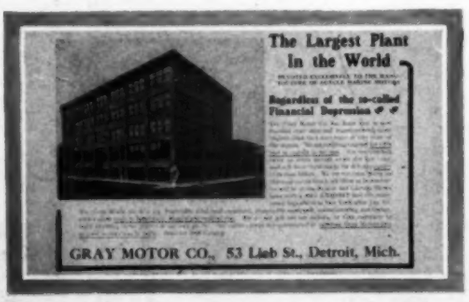
The Marblehead Race was won this year by Blue Peter V in the record time of 27 hours, 34 minutes, 45 seconds. The International Race for the Harmsworth Trophy was won again by Dixie II, which also won the Gold Cup Race at the Thousand Islands and the E. R. Thomas Trophy for the Championship of the Great Lakes at Buffalo. What speed boat of the present day can show a record comparable with that of the famous Dixie II?

In July, 1911, the ocean race to Halifax, N. S., was won by Caroline, a 66-footer, after a hard trip through heavy seas and fog. The Gold Cup Races, held at the Thousand Islands, was won by Mitt II, more by luck and reliability than speed.

On June 11, Fred Thurber, T. R. Goodwin, and T. F. Day left Narragansett Bay in the 25-foot auxiliary yawl Sea Bird, bound for the Mediterranean. They arrived at Gibraltar on July 17, after a successful trip of 3,100 miles via the Azores. They made the trip in better time than many of the sailing vessels in the days before the steamships.

The International Race for the Harmsworth Trophy was won on Huntington Bay by Dixie IV, then the fastest 40-footer afloat, and possibly the fastest vessel irrespective of size. At subsequent speed trials she developed 45.77 statute m.p.h. The 1911 Astoria Regatta out in Oregon brought out some fast ones, the 40-footer, Oregon Wolf, developing a speed of 39.5 statute m.p.h.

On July 14, 1912, the motor boat Detroit, with its crew of four men and navigated by T. F. Day, left New Rochelle for St. Petersburg, Russia. This boat was built in Port Clinton, O., was 35 feet long, 9 feet beam and 4 feet, 7 inches draught, and powered with a 16 h.p. Scripps motor. The boat and crew arrived safe and sound at St. Petersburg on September 13, completing the entire trip from Detroit, Mich., under its own power.



Reproduction of the advertisement of the Gray Motor Co. which appeared in the first issue of MoToR BoatinG, ten years ago

The New York Athletic Club's 100-mile Block Island Race was won by Thistle in the record time of 10 hours, 45 minutes. The annual meet of the Western Power Boat Association at Chicago developed some fast ones, especially Disturber III.

The 1912 Bermuda race was sailed from Philadelphia instead of New York and was won by Dream, a 40-footer driven by a 16 h.p. engine, the elapsed time being 104 hours, 29 minutes and 5 seconds. The Gold Cup Race was won by P. D. Q. II, of the Thousand Islands Yacht Club. The International Race for the Harmsworth Trophy held at Huntington Bay was won by the English boat, Maple Leaf IV. The Pacific Coast Championship race at the Astoria Regatta was won for a second time by Oregon Wolf.

The 1913 Bermuda Race was won for the second time by Dream, bettering the previous season's time by nearly six hours. The Gold Cup Race at the Thousand Islands was won by Ankle Deep, taking the cup to Lake George after nine consecutive years on the St. Lawrence.

The 1913 International Race for the Harmsworth Trophy was won a second time by Maple Leaf IV, over a 32.5 nautical-mile-course, defeating the American challenge team, Ankle Deep and Disturber III.

The Block Island Race of 1914 was again won by Thistle, in the record time of 10 hours, 10 minutes. The Cornfield Lightship Race was won by Flyaway III, establishing a new record for cruisers of 183

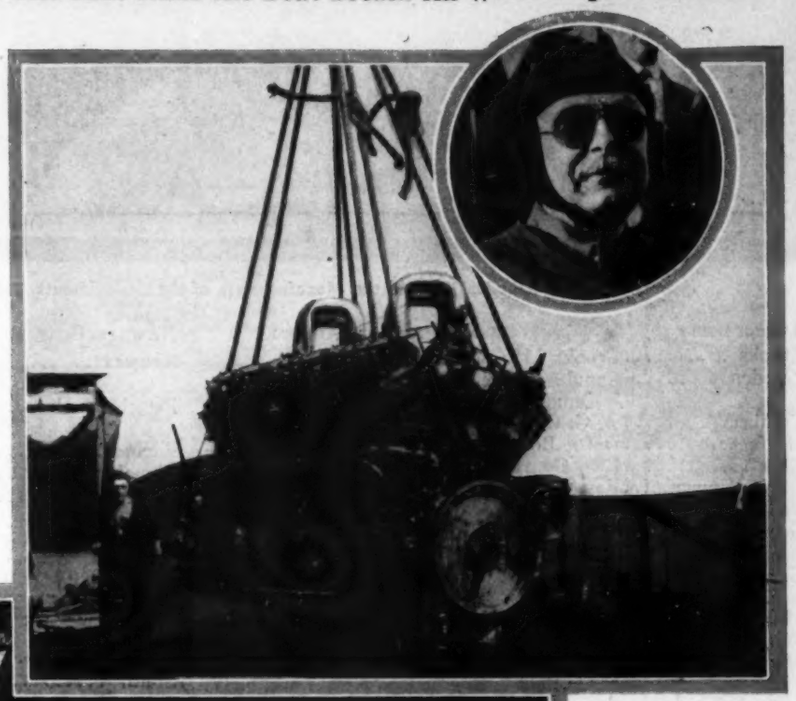
(*Continued on page 70*)

Seventy Miles an Hour in a Motor Boat

Whip-po'Will, Jr., the Wonderful Hydroplane Owned by Commodore Judson, Finally Gets Into Action—In a Series of Official One-Mile Runs the Boat Breaks All World's Speed Records

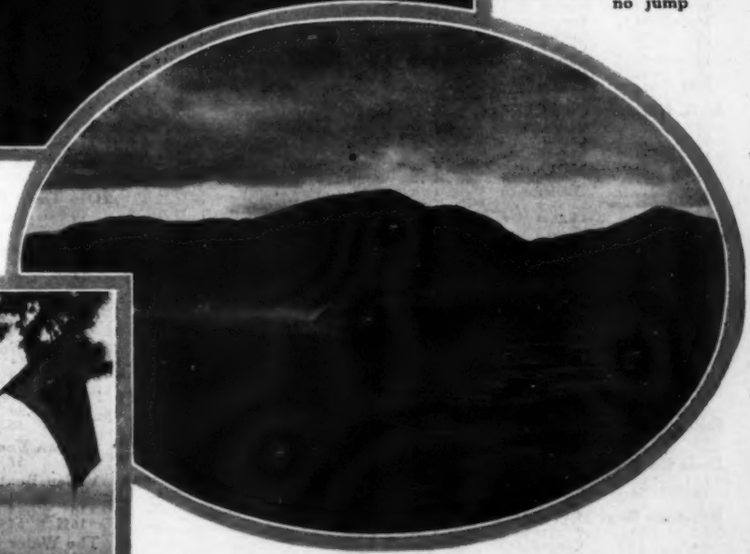
LITERALLY it took centuries to obtain 30 miles an hour on the water; then six years to obtain 40; three more to get 50, and two additional years to get an authentic and official mile-a-minute record. In 1916 the highest record which was reached was 61.08 miles an hour. This record stood until August 28 of this year when it was slightly bettered and a new record of 61.72 miles an hour established. This record was made at so late a date in the season that few people gave the subject of a higher speed for the season of 1917 any further consideration. The existing record was made snug for the winter in the archives of the Detroit Yacht Club, the organization which won it at Minneapolis last summer with their "Miss Detroit II."

But one cold and windy evening early in November on Lake George in the same latitude as Portland, Maine, after judges and timers had been waiting continuously for forty-eight hours for a Nor'west gale to die down enough to make it safe for a hydroplane to float, to say nothing of running against time, but had given up in despair, then the crew decided to make a try in spite of the adverse



The twelve-cylinder, 500 h.p. motor of Whip-po'Will, Jr. Note its size compared with the man standing alongside. Insert is Commodore Judson, the owner and driver of the fastest boat in the world

Whip-po'Will, Jr., on her cradle at the entrance of her boat-house at Lake George. A good idea of the shape and construction of the hull can be obtained from this view



At 70 m.p.h there is little fuss and absolutely no jump

conditions. It was then that a little craft which had been heard of but never had given even a fair answer to the reason for her existence came out on to the exposed lake, ran like the scared demon himself, and in six one-mile dashes over a course surveyed by an ex-Army officer averaged 64.74 miles an hour. This was not all either, for two days later with a slightly smaller propeller and a few minor adjustments to the power plant, the boat went over the same course for six one-mile dashes and developed a speed which averaged 69.39 miles an hour, the best and fastest speed on record to date. On the two best runs, the fourth and sixth, the average of the four watches showed 51.35 seconds for the mile, which is equivalent to 70.15 statute miles an hour, so the 70-mile-an-hour boat is with us in 1917.

Henry Sampson, official timer of the A. P. B. A., times the boat on her record breaking runs, thus making the record official

The development of this 70-mile-an-hour boat has been the result of much thought and painstaking effort in which luck played no part. The owner of Whip-po'Will made an effort earlier in the season to prove that his craft was fast, but as is usually the case with racing machines, particularly those of the hydroplane type, the owner's ambitions were a few months ahead

(*Continued on page 70*)

BUILDERS OF STANDARDIZED DESIGN BOATS

An Alphabetical List of the Manufacturers of the Stock Boats Tabulated on Pages 54 and 55

NAME OF BOAT	MANUFACTURER AND ADDRESS
Brooks	Brooks Mfg. Co., Saginaw, Mich.
Camden	Camden Anchor-Rockland Machine Co., Camden, Me.
Cuthbert	A. G. Cuthbert & Co., Chicago, Ill.
†Defoe	Defoe Boat & Motor Wks., Bay City, Mich.
Elco	Elco Co., Bayonne, N. J.
Fay & Bowen	Fay & Bowen Engine Co., Geneva, N. Y.
Fellows	Fellows & Stewart, Inc., Wilmington, Calif.
Great Lakes	Great Lakes Boat Bldg. Corp., Milwaukee, Wis.
Greenport	Greenport Basin & Const. Co., Greenport, L. I.
Hacker	John L. Hacker Boat Co., Detroit, Mich.
Holmes	L. C. Holmes, West Palm Beach, Fla.
Hunter	Everett Hunter Boat Co., McHenry, Ill.
Hyde	Hyde Boat & Engine Co., New York, N. Y.
Launch Exchange	Launch Exchange & Repair Co., Edgewater, N. J.
*Lawley	Geo. Lawley & Son Corp., Neponset, Mass.
Moxley	W. J. Moxley & Son, Cos Cob, Conn.
Mullins	W. H. Mullins Co., Salem, O.

NAME OF BOAT	MANUFACTURER AND ADDRESS
Niagara	Niagara Motor Boat Co., North Tonawanda, N. Y.
Peterborough	Peterborough Canoe Co., Peterborough, Ont., Can.
Racine	Racine Boat Co., Racine, Wis.
Ramaley	Ramaley Boat Co., Wayzata, Minn.
Rehder	Rehder Boat Wks., Bayview, Ida.
Reliance	Reliance Motor Boat Co., New York, N. Y.
Richardson	Richardson Boat Co., North Tonawanda, N. Y.
Rippley	Rippley Mfg. & Steel Boat Co., Grafton, Ill.
Ross	J. H. Ross Boat & Canoe Co., Orillia, Ont., Can.
Sea Bright	Sea Bright Dory Wks., Long Branch, N. J.
Smith	C. C. Smith Boat & Engine Co., Algonac, Mich.
Speedway	Gas Engine & Power Co., & Chas. L. Seabury & Co., Cons., Morris Heights, N. Y.
Toppan	Toppan Boat Mfg. Co., Boston, Mass.
Valley	Valley Boat Co., Saginaw, Mich.

*No stock boats on hand at present time. Busy on government work.
†Carried in stock in knock-down form only.

Stock Boats for Outboard Motors

A Complete Summary of All Models on the Market Which Are Built Especially for This Service—Details as to Length, Beam, Construction, Finish, Etc.

Length Feet	Beam Inches	Construction	Keel and Frame	Planking	Finish	Fastenings
Brooks Mfg. Co., Saginaw, Mich.:						
15	43	Carvel	Oak	.....	Paint	Copper
14	41	Carvel	Oak	.....	Paint	Copper
14	41	Clinker	Oak	.....	Paint	Copper
15	43	Carvel	Oak	.....	Paint	Copper
16	42	Carvel	Oak	.....	Paint	Copper
16	42	Clinker	Oak	.....	Paint	Copper
16½	..	Clinker	Oak	.....	Paint	Copper
A. G. Cuthbert Co., Chicago, Ill.:						
12	..	Carvel	Oak	Cedar	Varnish	Galv. Iron
15	..	Carvel	Oak	Cedar	Varnish	Copper
17	..	Carvel	Oak	Cedar	Varnish	Copper
11	..	Carvel	Oak	Cedar	Varnish	Copper
13	..	Combination	Oak	Cedar	Varnish	Copper
15	..	Combination	Oak	Cedar	Varnish	Copper
14	..	Clinker	Oak	Cedar	Varnish	Copper
16	..	Clinker	Oak	Cedar	Varnish	Copper
Deering Boat Mfg. Co., Madison, Wis.:						
17	42	Carvel	Oak	Cypress	Varnish	.....
17	42	Carvel	Oak	Cypress	Paint	.....
15	40	Carvel	Oak	Cypress	Varnish	.....
15	40	Carvel	Oak	Cypress	Paint	.....
15	33	Clinker	Oak	Cypress	Paint	.....
15	36	Flat-Bottom	Oak	Cypress	Paint	.....
Evinrude Motor Co., Milwaukee, Wis.:						
12	52	.....	.....	.....	.....	.....
14	36	.....	.....	.....	.....	.....
16	46	.....	.....	.....	.....	.....
16	46	.....	.....	.....	.....	.....
Fellows & Stewart, Inc., Wilmington, Calif.:						
14	54	Carvel	Oak	Cedar	Varnish	Galv. Iron
Hyde Boat & Engine Co., New York, N. Y.:						
12	48	Flat-Bottom	Oak	Cedar	Paint	Galv. Iron
15	54	Clinker	Oak	Cedar	Varnish	Copper
Keystone Boat Mfg. Co., Wayzata, Minn.:						
12	50	Clinker	Oak	Cedar	Varnish	Copper
14	50	Clinker	Oak	Cedar	Varnish	Copper
16	50	Clinker	Oak	Cedar	Varnish	Copper

Length Feet	Beam Inches	Construction	Keel and Frame	Planking	Finish	Fastenings
Dan Kidney & Son, West De Pere, Wis.:						
15	48	Carvel	Oak	Cedar	Paint	Galv. Iron
16	48	Carvel	Oak	Cedar	Paint	Galv. Iron
17	48	Carvel	Oak	Cedar	Paint	Galv. Iron
18	48	Carvel	Oak	Cedar	Paint	Galv. Iron
15	48	Clinker	Oak	Cedar	Paint	Galv. Iron
16	48	Clinker	Oak	Cedar	Paint	Galv. Iron
17	48	Clinker	Oak	Cedar	Paint	Galv. Iron
18	48	Clinker	Oak	Cedar	Paint	Galv. Iron
B. N. Morris, Inc., Veazie, Me.:						
14	50	Canvas-Covered	Spruce	Cedar	Paint	Copper
The W. H. Mullins Co., Salem, O.:						
14	48	.....	Pressed Steel	.....	Paint	.....
Old Town Canoe Co., Old Town, Me.:						
16	40	Canvas-covered square-stern canoe				
16	47	Canvas-covered square-stern sponson canoe				
Peterborough Canoe Co., Peterborough, Ont.:						
16	46	Carvel	Oak	Cedar	Paint	Iron
17	48	Carvel	Oak	Cedar	Varnish	Copper
Racine Boat Co., Racine, Mich.:						
16	50	Carvel	Oak	Cedar	Varnish	Brass
16	50	Clinker	Oak	Cedar	Painted	Copper
Ramaley Boat Co., Wayzata, Minn.:						
16	53	Clinker	Oak	Cedar	Paint	Copper
18	56	Clinker	Oak	Cedar	Paint	Copper
P. L. Rehder, Bayview, Ida.:						
15	30	Clinker	Oak	Cedar	Paint	Tinned
16	36	Clinker	Oak	Cedar	Varnish	Copper
Toppan Boat Mfg. Co., Medford, Mass.:						
15	57	Clinker	Oak	Pine	Paint	Galv. Iron
Valley Boat Co., Saginaw, Mich.:						
14	48	Seam and Batten	Oak	Cedar	Varnish	Copper
16	48	Seam and Batten	Oak	Cedar	Varnish	Copper
16½	54	Seam and Batten	Oak	Cedar	Varnish	Copper
The Water Craft Co., New York, N. Y.:						
15	50	Clinker	Oak	Cypress	Varnish	Copper

THE BOATS OF STANDARD DESIGN FOR NINETEEN-EIGHTEEN

The Abbreviations Used in the Column Under Type Have the Following Meanings—

B. D.—Bridge deck
Cr.—Cruiser
Day—Day cruiser
Exp.—Express cruiser
F.—Freighter
F. B.—Commercial fishing boat
H.—Hydroplane or monoplane
Patrol—Patrol cruiser
Rbt.—Runabout
R. D.—Raised-deck cruiser
Scout—Scout cruiser
St.—Steel boat
S. W.—Shoal water craft
Tender—Yacht tender
T. S.—Transom stern
V—V-bottom
W. B.—Whale boat

Cruisers

Length	Builder	Type	Beam	Draft	H.P.	R. P. M.	Wheel	Speed
25'	Defoe	T. S.	6'6"	26"	..	..	....	..
25'	Defoe	V	7'6"	..	..	..	....	..
26'	Brooks	Cr.	7'	22"	10	..	....	8½
26'	Richardson	Cr.	8'	30"	..	..	....	..
26'	Sea Bright	Cr.	7'	21"	16	800	20"x24"	10
28'	Defoe	F. B.	8'	26"	..	..	....	..
28'	Valley	Cr.	8'	26"	16	600	18"x—	10
30'	Brooks	Cr.	7'6"	24"	14	...	.....	10
30'	Camden	Exp.	7'	26"	20-35	900	16"x25"	15
30'	Camden	Yawl	7'2"	28"	15	500	24"x26"	10
30'	Defoe	T. S.	8'	28"	..	...	.....	..
30'	Defoe	V	8'6"	..	..	...	.....	..
30'	Holmes	Cr.	7'6"	26"	25	900	21"x—	9¼
30'	Moxley	Cr.	8'	32"	18	550	22"x22"	9
30'	Racine	Cr.	7'	24"	25	...	.....	12
30'	Richardson	V	8'6"	32"	..	...	.....	..
30'	Richardson	Cr.	8'6"	35"	..	...	.....	..
30'	Ross	Cr.	8'	30"	25	600	20"x22"	9
30'	Toppan	R. D.	8'	36"	25	800	24"x—	10
32'	Defoe	W. B.	9'2"	30"	..	...	.....	..
32'	Elco	T. C.	8'6"	27"	20	600	18"x—	10
32'	Launch Exh'ge	R. D.	9'	35"	..	...	.....	..
32'	Valley	Day	8'	27"	50	850	22"x—	..
35'	Brooks	Cr.	8'	24"	10-25	...	.....	7-12
35'	Brooks	Cr.	8'	27"	18	...	.....	11
35'	Defoe	W. B.	9'4"	32"	..	...	.....	..
35'	Defoe	T. S.	8'3"	30"	..	...	.....	..
35'	Greenport	Cr.	8'6"	30"	50	900	24"x22"	15
35'	Richardson	V	8'6"	36"	..	...	.....	..
35'	Ross	Cr.	10'	36"	50	600	24"x34"	12
35'	Sea Bright	Cr.	10'	24"	35	800	24"x24"	10
35'	Valley	Cr.	8'6"	30"	25	900	20"x—	10
35'	Racine	R. D.	8'	36"	35	...	.....	12
36'	Defoe	Exp.	6'	..	..	...	.....	..
36'	Defoe	V	8'6"	..	..	...	.....	..
36'	Holmes	Day	7'6"	28"	75	1,100	22"x—	17½
36'	Moxley	Cr.	9'	34"	24	550	24"x24"	9
36'	Richardson	Cr.	9'6"	36"	..	...	.....	..
40'	Defoe	W. B.	10'2"	34"	..	...	.....	..
40'	Great Lakes	Exp.	9'	32"	160	1,400	.....	20
40'	Greenport	Cr.	8'	30"	50	1,100	24"x22"	17
40'	Richardson	V	9'6"	36"	..	...	.....	..
40'	Richardson	Cr.	11'	38"	..	...	.....	..
40'	Speedway	Exp.	8'9"	33"	130	1,000	.....	20
40'	Toppan	Scout	8'	48"	85	800	26"x—	15
40'	Valley	B. D.	10'	30"	60	900	24"x—	14
40'	Defoe	T. S.	9'	30"	..	...	.....	..
41'	Brooks	Cr.	9'1½"	31"	25	...	.....	10
42'	Greenport	B. D.	8'6"	36"	35	550	28"x32"	12
45'	Defoe	W. B.	10'4"	36"	..	...	.....	..
45'	Moxley	Cr.	10'	38"	35	450	.....	12
45'	Richardson	Cr.	13'	46"	..	...	.....	..
45'	Sea Bright	Cr.	13'	30"	35	800	24"x24"	9
45'	Smith	Day	8'	26"	270	1,404	.....	36
45'	Smith	Day	8'	26"	450	1,400	.....	42
45'	Valley	B. D.	10'6"	42"	50	900	26"x—	13
45'	Defoe	T. S.	9'	30"	..	...	.....	..
45'	Elco	R. D.	10'6"	40"	25	400	28"x—	10½
48'	Defoe	Tug	11'	66"	..	...	.....	..
50'	Defoe	W. B.	11'	36"	..	...	.....	..
50'	Great Lakes	Exp.	10'	36"	200	1,400	.....	24
50'	Great Lakes	Patrol	10'	36"	200	1,400	.....	24
50'	Defoe	T. S.	10'	34"	..	...	.....	..
50'	Defoe	F.	15'	36"	..	...	.....	..
50'	Elco	R. D.	10'4"	40"	60	600	32"x—	13
52'	Great Lakes	Exp.	11'	36"	200	1,400	.....	22
52'	Speedway	Exp.	11'4"	34"	130	1,000	.....	18
52'	Speedway	Exp.	11'4"	34"	260	1,000	.....	24
55'	Defoe	W. B.	11'3"	40"	..	...	.....	..
55'	Defoe	T. S.	10'	34"	..	...	.....	..
56'	Great Lakes	Exp.	11'	32"	350	1,300	.....	25
60'	Defoe	W.B.	12'6"	48"	..	...	.....	..
60'	Great Lakes	Patrol	12'	39"	400	1,400	.....	28
60'	Greenport	Patrol	10'	36"	500	1,100	27"x30"	30
60'	Speedway	Exp.	11'4"	34"	260	1,000	.....	22
60'	Speedway	Exp.	11'4"	34"	350	1,000	.....	25
65'	Defoe	W. B.	12'8"	50"	..	...	.....	..
65'	Defoe	T. S.	14'	48"	..	...	.....	..
65'	Defoe	F.	15'	48"	..	...	.....	..
72'	Greenport	Patrol	11'3"	42"	750	1,200	30"x28"	28

Other Types

Length	Builder	Type	Beam	Draft	H.P.	R. P. M.	Wheel	Speed
10'	Hyde	Tender	4'2"	..	4	900	12"x—	7
12'	Hyde	Tender	4'2"	..	6	900	14"x—	7½
14'	Toppan	Hydro	4'	18"	14	1,200	13"x—	15
15'	Brooks	Open	3'7"	..	2	...	.....	7
15'	Cuthbert	Rbt.	....	..	..	...	.....	..
15'	Racine	Rbt.	4'4"	14"	8	...	.....	12
16'	Hunter	Rbt.	4'6"	13"	3	...	12"x—	..
16'	Hunter	V Rbt.	....	..	..	...	.....	..

Other Types—(Continued)

Length	Builder	Type	Beam	Draft	H.P.	R. P. M.	Wheel	Speed
16'	Hyde	Dory	5'4"	16"	2½	800	12"x—	8
16'	Hyde	Rbt.	4'6"	16"	6	700	12"x—	9
16'	Moxley	Open	4'6"	20"	2½-5	600	14"x20"	7
16'	Mullins	Hydro	4'4"	17"	18-25	1,500	16"x24"	28
16'	Mullins	Open T. S.	4'6"	5"	3	900	12"x12"	6½
16'	Mullins	Open T. S.	4'2"	5"	6	900	12"x18"	7½
16'	Mullins	Open T. S.	4'2"	5"	8-10	1,200	12"x15"	8½
16'	Mullins	Open St.	4'	12"	6	900	12"x18"	11
16'	Mullins	Open St.	4'	12"	3	900	12"x12"	10
16'	Ross	Open	3'10"	18"	3	600	12"x15"	7
16'	Speedway	Tender	4'9"	18"	12-15	...	.....	12
16'	Valley	Hydro	4'4"	20"	25	1,600	16"x—	30
16'6"	Valley	Rbt.	4'6"	12"	9	1,000	13"x—	14
17'	Brooks	Open	3'9"	6"	6-25	...	.....	10-32
17'	Cuthbert	Rbt.	....	..	..	...	.....	..
17'	Mullins	Open	4'2"	15"	6	900	12"x18"	7
17'	Mullins	Open	4'2"	15"	6	900	12"x18"	8½
17'	Mullins	Open	4'2"	15"	8-10	1,200	12"x15"	10
17'6"	Brooks	Hydro	4'8"	7"	..	...	.....	..
18'	Brooks	Open	4'1"	14"	2½-4	...	.....	7½-9
18'	Cuthbert	Rbt.	....	..	..	...	.....	..
18'	Defoe	Rbt.	4'2"	18"	..	...	.....	..
18'	Defoe	Open	4'4"	19"	..	...	.....	..
18'	Defoe	V Rbt.	4'8"	..	..	...	.....	..
18'	Fellows	Open	4'6"	12"	10	...	.....	14
18'	Greenport	Tender	5'	20"	15	1,000	12"x18"	15
18'	Hunter	Rbt.	5'	14"	3-7	...	12"x—	..
18'	Hunter	V Rbt.	....	..	..	...	.....	..
18'	Hyde	Rbt.	5'	18"	6-8	750	14"x—	9-12
18'	Hyde	Dory	5'8"	20"	4	800	14"x—	8
18'	Mullins	Open St.	4'9"	15"	8-10	1,200	12"x15"	10
18'	Mullins	Open St.	4'9"	15"	6	900	12"x18"	10
18'	Mullins	Open St.	4'9"	14"	6	900	12"x18"	8
18'	Mullins	Open St.	4'9"	14"	3	900	12"x12"	7
18'	Peterborough	Open	4'	16"	3	800	12"x—	8
18'	Ramaley	Open	5'	6"	12	1,000	13"x13"	15
18'	Richardson	Rbt.	4'10"	20"	..	...	.....	..
18'	Speedway	Tender	5'	18"	22-28	...	.....	15
18'	Toppan	Dory	5'	20"	3	700	14"x—	7
19'	Camden	Yawl	5'	20"	4½	600	17"x17"	8
19'	Racine	Rbt.	4'6"	18"	12	...	.....	14
19'	Speedway	Tender	5'	18"	22-28	...	.....	15
19'	Valley	Rbt.	4'8"	20"	12	1,000	16"x—	16
20'	Brooks	Hydro	4'8"	8"	..	...	.....	..
20	Camden	Rbt.	5'8"	20"	5½	600	18"x18"	10
20'	Defoe	S.W.Open	4'8"	10"	..	...	.....	..
20'	Defoe	Rbt.	4'3"	20"	..	...	.....	..
20'	Hunter	V Rbt.	....	..	..	...	.....	..
20'	Hyde	Rbt.	5'	20"	6-8	750	14"x—	9-12
20'	Hyde	Dory	5'10"	20"	6	800	14"x—	8
20'	Moxley	Open	5'8"	24"	5-7	600	18"x20"	9
20'	Mullins	Open St.	5'	20"	8-10	1,200	12"x15"	11
20'	Mullins	Open St.	5'	20"	8	900	14"x18"	10
20'	Peterborough	Open	4'8"	20"	8	800	14"x—	10
20'	Peterborough	Rbt.	4'8"	20"	12	1,000	14"x—	12
20'	Rehder	Open V	4'2"	22"	12	1,000	15"x—	15
20'	Richardson	Rbt.	4'6"	22"	..	...	.....	..
20'	Ross	Open	5'	20"	6	800	14"x17"	8
20'	Smith	Hydro	6'7"	20"	250	1,800	20"x40"	55
20'	Smith	Hydro	6'	18"	18	1,000	14"x21"	16
20'	Speedway	Tender	5'6"	20"	22-28	...	.....	15
20'	Toppan	Dory	5'6"	22"	6	700	14"x—	8
21'	Cuthbert	Rbt.	....	..	..	...	.....	..
21'	Defoe	Open	4'8"	20"	..	...	.....	..
21'	Defoe	V Rbt.	5'	..	..	...	.....	..
21'	Fay & Bowen	Rbt.	5'	24"	22	1,100	.....	16
21'	Greenport	Tender	5'3"	22"	12	1,000	14"x16"	12
21'	Hunter	Rbt.	5'	15"	7-10	...	14"x—	..
21'	Mullins	Open	4'6"	20"	8-10	1,200	12"x15"	11
21'	Mullins	Open	4'6"	20"	12	1,150	14"x20"	12
21'	Mullins	Open	4'6"	20"	8	900	14"x18"	10
21'	Reliance	Rbt.	4'8"	20"	24-40	1,400	.....	17-24
21'	Sea Bright	Dory	6'	18"	11	800	20"x20"	10
21'	Speedway	Tender	5'6"	20"	22-28	...	.....	15
21'	Toppan	Rbt.	5'	22"	12	1,100	16"x—	14
22'	Brooks	Hydro	4'8"	8"	..	...	.....	..
22'	Brooks	Open	5'4"	18"	4-8	...	.....	7½-9
22'	Camden	Yawl	5'9"	24"	5½	600	18"x18"	8
22'	Hunter	Rbt.	5'6"	16"	7-10	...	14"x—	..
22'	Hyde	Dory	6'	22"	8	800	15"x—	8
22'	Mullins	Open St.	5'6"	22"	20	1,150	16"x20"	14
22'	Mullins	Open St.	5'6"	22"	12	1,150	14"x20"	12
22'	Ramaley	Rbt.	5'	6"	60	2,000	15"x15"	20
22'	Ramaley	Rbt.	5'	6"	16	1,000	16"x16"	18
22'	Toppan	Dory	6'	24"	10	1,200	15"x—	8½
23'	Brooks	Open	4'8"	10"	6-12	...	.....	9½-14
23'	Hunter	V Rbt.	....	..	..	...	.....	..
23'	Racine	Rbt.	4'10"	22"	25	...	.....	16
23'	Richardson	Rbt.	5'	24"	..	...	.....	..
23'	Ross	Open	5'2"	21"	10	800	16"x18"	9
23'	Speedway	Tender	5'8"	24"	22-28	...	.....	14
24	Cuthbert	Rbt.	....	..	..	...	.....	..

(*Continued on page 56*)

The War Tax on Motor Boats

What the War Tax Amounts to, Where to Pay It, How to Figure Tonnage As Well As Other Heretofore Unpublished Data Concerning the New War Measure

OWNERS of motor boats and sail boats should not forget the war tax on pleasure craft which was created by an Act of Congress on October 3, and became payable immediately. The tax is to be paid at the office of the collector of internal revenues of the districts in which the owner resides or in which the boat is kept. The name and address of the collector can be obtained at any postoffice.

Probably the first question that comes to the mind of the boat owner is whether his boat is under or over five tons. The term "net tonnage" has no relation to weight, or the ton as used for weighing coal, etc., but is a term applied to the cubic contents of that portion of a vessel adapted to carrying cargo or passengers. One hundred cubic feet is termed a ton. The displacement of a boat and the weight of a boat are one and the same thing but have no relation whatever to the tonnage.

The net tonnage can be closely estimated by first determining the gross tonnage and then making the deductions allowed by law. To compute the gross tonnage multiply the overall length (that is, the length from the forward side of the stem to the aftermost end of the stern planking) by the extreme beam and then multiply that product by the depth from the under side of the main deck to the frame in the hold at the midship section, then divide this product by 100. The gross tonnage is 6/10 of the result obtained by the above multiplications and division. To obtain the net tonnage the next operation is to find the cubic contents of such portions of the boat as are occupied by the power plant (not including fuel tanks), anchor gear, storage of sails and charts, the crew's quarters, the galley and such other space as is devoted exclusively to the navigation of the vessel. Under previous rulings of the department, an owner who has no paid crew and who operates the boat himself is considered as the crew and the deductions are made accordingly, which leaves very little space for net tonnage. After finding the cubic contents of the portions of the boat which are included under the above exemptions, divide by 100, and subtract the result from the gross tonnage. The result will be the net tonnage.

In computing tonnage the department has ruled that only such space as is enclosed by a permanent structure is to be included and that glass is not a permanent structure. This applies especially to glass cabin boats and boats with high trunk cabins with glazed sash. This interpretation of the law makes a boat which is included under either of the above conditions an open boat, and all open boats are rated as having no tonnage. A trunk cabin built with panels or other wood construction and provided with ports is considered a permanent structure. When an owner finds that his boat rates near five tons by the above method of procedure, he should at once notify the collector of internal revenue of his district and request that a survey be made. The department is obliged to make the survey free of charge, and the tax will not be in arrears until such time as the survey is completed, the application for measurement being accepted as evidence that the owner intends to pay the tax.

When it is definitely known that a boat is either under or over five tons, the best policy is to pay the tax immediately for it is in arrears after November 3, with a penalty of five per cent. plus interest at the rate of one per cent. per month. The penalty is not being enforced at the present time but it may be as soon as the department at Washington renders a decision on several points now in question.

Whoever fails to submit a return (application blank) on or before November 30, 1917, and thereafter on July 1 of each year, is subject to a penalty of not more than $1,000 or imprisonment for not more than one year, or both. This return must be made annually.

The tax for the first year (that is, the tax that is being collected now) is for the nine months from October 3, 1917, to July 1, 1918, and is 9/12 of the amount of the tax as computed for one year.

A uniform return blank has just been issued by the Treasury Department at Washington, and will undoubtedly be in use by the time this is read by motor boatmen.

To pay the tax it is first necessary to secure from the collector two copies of the application blanks, fill them out and have them acknowledged before a notary, then return them to the collector with the amount of the tax in cash, a certified check or a money order. The form of application is not uniform in all districts, some require the serial number and license number of the license issued by the Navy Department last summer, while some only require the registry number in cases where a boat is registered at the customhouse.

The method of figuring the tonnage, the deductions and various rulings on measurement and deductions can be found on page 56 of the November issue of MoToR BoatinG. The wording of the Act is as follows:

THE LAW

Sec. 603. That on the day this Act takes effect, and thereafter on July first in each year, and also at the time of the original purchase of a new boat by a user, if on any other date than July first, there shall be levied, assessed, collected, and paid upon the use of yachts, pleasure boats, power boats, and sailing boats, of over five net tons, and motor boats with fixed engines, not used exclusively for trade, or national defense, or not built according to plans and specifications approved by the Navy

(*Continued on page* 80)

The Boats of Standard Design

(*Continued from page* 55)

Other Types—(Continued)

Length	Builder	Type	Beam	Draft	H.P.	R. P. M.	Wheel	Speed
24'	Fay & Bowen	Rbt.	5'	20"	22	1,100	.....	16
24'	Lawley	Rbt.	5'4"	24"	30	800	.....	20
24'	Mullins	Open St.	5'6"	21"	12	1,150	14"x20"	13
24'	Mullins	Open St.	5'6"	21"	8	900	14"x18"	11½
25'	Brooks	Open	4'6"	14"	8-14	...	.....	10-18
25'	Brooks	Open	6'	18"	6-12	...	.....	7-12
25'	Camden	Yawl	6'2"	24"	7½	500	20"x20"	9
25'	Defoe	S.W.Open	5'8"	12"	..	...	.....	..
25'	Defoe	Open	5'8"	23"	..	...	.....	..
25'	Defoe	Rbt.	4'7"	20"	..	...	.....	..
25'	Defoe	V Rbt.	5'8"	..	..	...	.....	..
25'	Fellows	Open	5'0"	14"	25	...	.....	22
25'	Hacker	Rbt.	6'	22"	32	1,100	16"x24"	20
25'	Hacker	Rbt.	6'	22"	48	1,200	16"x26"	23
25'	Holmes	Rbt.	5'6"	23"	20	900	18"x—	15
25'	Hunter	Rbt.	6'	18"	10	...	15"x—	..
25'	Hunter	V Rbt.	..	..	..	...	.....	..
25'	Hyde	Rbt.	5'6"	22"	14-24	...	18"x—	10-15
25'	Moxley	Open	6'2"	28"	10	600	20"x20"	9
25'	Mullins	Open	5'	27"	35	1,175	18"x23"	20
25'	Mullins	Open	5'	27"	20	1,150	16"x20"	14
25'	Niagara	Rbt.	5'	..	25	1,140	18"x18"	16
25'	Peterborough	Rbt.	5'	24"	16	900	16"x—	14
25'	Racine	Rbt.	5'2"	24"	35	...	.....	20
25'	Ramaley	Rbt.	5'	4"	90	1,400	18"x26"	34
25'	Richardson	Rbt.	5'8"	24"	..	...	.....	..
25'	Richardson	Rbt.	6'	26"	..	...	.....	..
25'	Speedway	Rbt.	5'	22"	22-28	...	.....	17
25'	Speedway	Tender	5'9"	22"	22-28	...	.....	15
25'	Speedway	Tender	6'3"	24"	22-28	...	.....	15
25'6"	Smith	Hydro	6'	20"	40	1,200	16"x24"	25
26'	Cuthbert	Rbt.	..	..	..	...	.....	..
26'	Fay & Bowen	Rbt.	5'	22"	22	1,050	.....	14
26'	Fay & Bowen	Rbt.	5'	24"	35	1,000	.....	18
26'	Greenport	Open	4'3"	14"	30	1,000	18"x24"	22
26'	Greenport	Tender	5'3"	24"	20	1,000	16"x20"	18
26'	Holmes	Rbt.	4'9"	24"	35	1,100	18"x—	21
26'	Mullins	Open St.	6'	24"	35	1,175	18"x23"	20
26'	Mullins	Open St.	6'	24"	20	1,150	16"x20"	14
26'	Mullins	Open St.	6'	23"	20	1,150	16"x20"	14
26'	Mullins	Open St.	6'	23"	12	1,150	14"x20"	12
26'	Reliance	Rbt.	5'2"	22"	80-100	1,400	.....	33-36
26'	Sea Bright	Dory	7'	21"	16	800	20"x24"	10
26'	Toppan	Open	6'	30"	20	1,000	18"x—	12
26'	Valley	Rbt.	5'8"	22"	50	1,500	16"x—	25
26'	Valley	Rbt.	6'	18"	20	1,000	16"x—	16
27'	Hunter	Rbt.	6'6"	20"	15	...	16"x—	..
27'	Speedway	Sedan	6'	24"	22-28	...	.....	14
28'	Camden	Yawl	6'10"	26"	11	525	22"x24"	9
28'	Greenport	Rbt.	6'3"	24"	30	1,000	20"x24"	18
28'	Hunter	V Rbt.	..	..	..	...	.....	..
28'	Niagara	Rbt.	5'6"	..	35	1,100	17"x24"	18
28'	Ramaley	Rbt.	5'	8"	24-30	1,000	16"x22"	20
28'	Smith	Hydro	6'2"	22"	100	1,200	.....	32
28'	Speedway	Tender	6'3"	27"	35-44	...	.....	17
30'	Brooks	Open	5'	14"	12-25	...	.....	10-17
30'	Defoe	S.W.Open	8'	10"	..	...	.....	..
30'	Defoe	Open	6'8"	26"	..	...	.....	..
30'	Defoe	Rbt.	5'4"	25"	..	...	.....	..
30'	Elco	Rbt.	6'	22"	65	1,000	18"x—	22
30'	Fay & Bowen	Rbt.	5'6"	26"	50	1,000	.....	20
30'	Lawley	Rbt.	5'8"	24"	50	1,000	.....	18
30'	Moxley	Open	7'	30"	10-20	...	.....	..
30'	Ramaley	Rbt.	7'	8"	65	1,000	18"x26"	30
30'	Racine	Rbt.	6'4"	30"	35	...	.....	14
30'	Reliance	Rbt.	6'	25"	125-150	1,400	.....	33-36
30'	Richardson	Rbt.	6'4"	..	..	...	.....	..
30'	Ross	Rbt.	5'6"	24"	25	800	19"x26"	16
30'	Ross	Rbt.	5'6"	24"	65	1,100	18"x28"	25
30'	Sea Bright	Dory	10'	24"	35	800	24"x24"	10
30'	Speedway	Rbt.	6'	30"	35-44	...	.....	19
30'	Speedway	Sedan	6'	30"	35-44	...	.....	17
30'	Speedway	Tender	6'	24"	35-44	...	.....	18
30'	Speedway	Tender	6'9"	27"	35-44	...	.....	20
30'	Toppan	Open	7'	36"	25-35	900	20"x—	13
31'	Hunter	Rbt.	6'9"	22"	20	...	18"x—	..
31'	Hunter	V Rbt.	..	..	..	...	.....	..
32'	Elco	Rbt.	6'2"	25"	100	1,000	18"x—	30
32'	Fay & Bowen	Rbt.	5'6"	25"	28	1,000	.....	15
32'	Fay & Bowen	Rbt.	5'6"	27"	45	1,000	.....	20
32'	Fay & Bowen	Rbt.	6'	28"	75	1,100	.....	22½
32'	Greenport	Rbt.	5'	27"	100	1,200	22"x30"	30
32'	Niagara	Rbt.	5'6"	..	35	1,100	17"x24"	18
32'	Niagara	Rbt.	6'	..	60-100	1,450	18"x28"	28
32'	Speedway	Rbt.	6'	30"	50-66	...	.....	22
32'	Speedway	Tender	7'	30"	50-66	...	.....	20
35'	Defoe	Open	7'4"	27"	..	...	.....	..
35'	Lawley	Rbt.	6'	24"	100	1,300	.....	25
35'	Racine	Rbt.	6'	24"	60	...	.....	25
35'	Ramaley	Rbt.	6'	8"	50	1,000	18"x28"	25
35'	Ramaley	Rbt.	7'6"	8"	100	1,100	19"x28"	30
35'	Ramaley	Rbt.	8'	8"	60	1,000	18"x26"	26
35'	Ross	Rbt.	5'9"	24"	100	1,200	20"x32"	30
35'	Sea Bright	Dory	10'	24"	35	800	24"x24"	10
35'	Smith	Hydro	7'	24"	225	1,400	.....	38
35'	Speedway	Rbt.	6'6"	30"	130-150	...	.....	28
35'	Speedway	Sedan	6'	30"	50-66	...	.....	20
35'	Speedway	Tender	7'3"	30"	130-150	...	.....	26
36'	Brooks	Open	5'	14"	14-25	...	.....	12-18
36'	Elco	Rbt.	5'6"	23"	100	1,000	.....	12-18
37'	Niagara	Rbt.	6'6"	..	145	1,450	.....	30
37'	Speedway	Sedan	6'	30"	130-150	...	.....	26
40'	Defoe	Rbt.	8'	28"	..	...	.....	..
40'	Defoe	Open	8'4"	30"	..	...	.....	..
40'	Defoe	S.W.Open	11'	12"	..	...	.....	..
40'	Speedway	Rbt.	6'6"	30"	130-150	...	.....	27
50'	Defoe	S.W.Open	12'	14"	..	...	.....	..
55'	Ripley	Open	12'	20"	40	...	20"x—	12
60'	Defoe	S.W.Open	12'	36"	..	...	.....	..
62'	Ripley	Open	10'	26"	40	...	30"x—	10

Yard and Shop

An Efficient Primary Training Aeroplane

What promises to be one of the important developments which will materially help to bring America's progress of aerial activity into speedy operation is a new type of training airplane which has just been brought out in this country by the Ordnance Engineering Corp., of New York City.

Although not differing in principle from the standard type of training aeroplanes now being used for training purposes, the new machine possesses new features of design and control which enable pupils to be trained on it in safety and in half the time ordinarily required.

In the new Ordnance biplane, danger and delay in teaching are practically done away with, as the instructor is seated beside his student within easy conversational distance and where the demonstration of the controls can be shown and practiced in the air without delay or danger. In the present training machines the pupil is seated either in front or in back of the pilot, according to the amount of training the pupil has had, and it is this arrangement of having the pupil separated from the instructor which adds to the danger of training on the present type of machine and of necessity adds to the time required to try the pupil out with the necessary knowledge and experience to operate an aeroplane himself.

The new Ordnance Biplane, one of the latest types of American airplane for training aviators in half time, in which the seating arrangement is so placed that the pilot and student sit side by side. Dual control is used and every move of the pilot can be watched and duplicated by the pupil

Another development is the use of the new 100 h.p. Duesenberg motor, a new airplane engine modeled after the Duesenberg racing automobile engine and designed to run or operate in the air with the same ease and reliability and efficiency as the ordinary automobile engine. This Duesenberg airplane motor is by no means an automobile engine, but is the evolution of the Duesenberg automobile motor designed and adapted to the requirements of the airplane. In this airplane motor is incorporated the famous Duesenberg horizontal valve action which gives it tremendous power, yet enables the motor to run cool and efficiently at high speed for any length of time required.

Major Kilner, head of the Government Aviation Field at Mineola; Major Butts, Mineola Aviation Field; Captain C. A. Rice, Mineola Aviation Field; Lieutenant Haggerty, Lieutenant Strahlman, Lieutenant Salmon, Henry Woodhouse, and Alan R. Hawley, president of the Aero Club, have all either made flights in this new airplane or have made very close investigations concerning it, and it is the consensus of opinion that this new machine is a big step forward in the designing and building of an efficient primary training aeroplane.

Toppan Busy With Government Orders

The Toppan Boat Mfg. Co., of Boston and Medford, Mass., have had an exceedingly prosperous year, one that has far surpassed previous seasons. They have furnished the government with several launches, dories and dory launches, which are well adapted for government work, as they are built for service and are devoid of fancy finish. Recently they shipped a 26½ by 6-foot government model launch, equipped with a 17-25 h.p. Sterling motor to the Bayles shipyard, Port Jefferson, L. I., to be used as tender to the U. S. S. Lydonia.

The outfit was completed in exceptionally quick time, and the Toppan company was complimented by the purchasers on the fine appearance of the outfit and the promptness with which the deal went through. Another boat of the same model was sold to the Aluminum Co. of America, for use of the Tallassee Power Co., of Badin, N. C.

The Toppan government model launches are built from government specifications and for rough-water tender use. They are made with wide stern to prevent settling when under full speed, with fine lines to give a maximum speed with minimum power. They have a high, flaring bow which insures freedom from spray. They are planked with cypress, cedar or pine, have steam-bent oak timbers, oak keel and shaft log, and oak or canvas-covered decks with oak coaming varnished, brass deck fittings, cylindrical tank and side seats with lockers. The interior finish is cypress sheathing with three coats of varnish; the outside finish three coats of marine white with green copper below the water line. Another boat of the same model, 30 by 8 feet in length, was shipped recently to Mexico for M. Manzanilla, a well-known hemp importer.

The United States Navy Department has purchased from the Toppan Boat Mfg. Company a 22-foot dory launch with 9-12 h.p. Universal four-cylinder motor, a 20-foot smooth-planked Swampscott power dory, and a 20-foot lap-strake dory. The first two have been shipped to the Norfolk Navy Yard, while the third will be shipped to the Charlestown Navy Yard.

The Luders Marine Construction Co., of Stamford, Conn., have also purchased several of the 15-foot dories for use as lifeboats.

Alaned II, a 40-foot day cruiser, built by the Weckler Boat Co., of Chicago, for Al and Ed Schultz, of Beardstown, Ill. Equipped with a six-cylinder Model F Sterling motor she is capable of a speed of 24 m.p.h.

A Sterling-Powered Champion

Will O The Wisp II is the 1917 champion of Lake George. She is the property of Oscar Daniels, of New York, and when tuned up properly last summer was clocked by A. W. Crouch, of New York, who designed the craft, at 38 m.p.h. She is 37 by 6 feet and was built by the Leyare Boat Wks., of Ogdensburg, N. Y.

The speed is furnished by a Model F eight-cylinder 180-200 h.p. Sterling motor, of the counterbalanced crankshaft type, turning a 21 by 33-inch Columbian propeller at 1,400 r.p.m. The power generated is sufficient to force the boat out so far that the spray shoots from near the center of the craft, probably half the weight of the motor, the entire forward portion of the boat being devoid of any water support.

In a series of fifteen-mile races held on Saturday afternoons on Lake George all summer long, Will O The Wisp demonstrated that she was just enough faster than her rivals, of which there are many on the lake, to establish an undisputed championship.

Addition to Durkee Plant

When the new buildings and storage facilities are completed, which will be in a few weeks, the original capacity of the plant of C. D. Durkee & Co., of New York City, will be trebled.

This is the third big addition to their Grasmere plant made in the last three years, owing to the ever-increasing demand for ship and boat hardware. The mop and broom factory has been transferred to Grasmere to make room for space needed at the New York plant, as the output of the machine shops and flag factory call for more room to meet the increasing business.

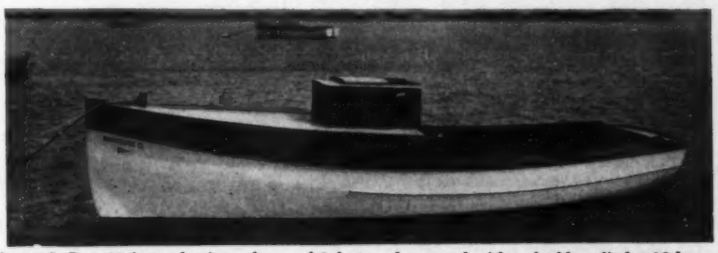
Port lights, deck plates and cabinet hardware and other Durkee specials are keeping all hands busy at the Staten Island factory and it looks as though there will be no letup all winter.

The 6 H.P. Caille Unit Power Plant

One of the illustrations on page 58 shows a new 6 h.p. unit plant, the reversing gear integral with the motor itself. This motor has been built by the Caille Perfection Motor Co., of Detroit, Mich., because so many owners of small boats of from 15 to 20 feet in length wish an engine of this size with gear and, of course, it is an advantage to have the built-in gear rather than to have the gear as a separate unit.

A launch or runabout with this little power plant in it can be handled with ease in the most crowded waters. The gear shift is instantaneous and easy, requiring no particular muscular effort, and quick shifting is possible from speed ahead to neutral or to speed reverse and vice versa.

This little power plant has bore and stroke dimensions of 4¼ by 4½ inches. The three-bladed propeller, having a 16-inch diameter by 18-inch pitch, operates at a speed of from 250 to 800 r.p.m.



Gertrude D, a 26-footer having a beam of 9 feet, and powered with a double-cylinder 16 h.p. Frisbie motor having a bore and stroke of 6x6 inches. Her owner, Elmer Dodge, uses his craft at Block Island

Hyde Turbine Type Propellers

The 1917 season has been a record-breaker for Hyde turbine type propellers, manufactured by the Hyde Windlass Co., of Bath, Me.

In addition to increased sales, a Hyde-equipped boat, Miss Detroit II, broke all existing speed records beside capturing the famous Gold Challenge Cup. Incidently, 1917 marked the fourth consecutive year that the Cup has been won by a boat using a Hyde turbine type propeller.

The Hyde No-Weed propeller continues a favorite with boatmen operating in weed-obstructed waters, while the Gale propeller is popular as a low-priced wheel. Being cast from Hyde patterns, the Gale may be obtained in the same wide range of sizes as the famous Hyde wheel.

Two 35-Milers

Sterling II was built this season by the Leyare Boat Works for a New York client. She is a Crouch-

One of the government model launches built by the Toppan Boat Mfg. Co., of Boston, Mass. The Toppan government launches are built for rough water tender use from government specifications

Alpha is one of the most popular workboats used in Alaskan waters. She is owned by Hogue and Twetan, of Petersburg, Alaska, and is powered with a 20 h.p. Buffalo motor

designed V-bottom 26-footer with a beam of 5 feet 2 inches and has a record of one mile in 1:46 or at the rate of 33.98 m.p.h on her trials. A Sterling Model F four-cylinder counterbalanced crankshaft motor, of from 90-100 h.p. turns an 18- by 28-inch Columbia propeller at 1,510 r.p.m.

There are probably very few motor boats actually capable of 35 m.p.h. when powered with but a four-cylinder, 100 h.p. motor. Notable among the boats this season which attained this desirable speed, is the J.M.R., J. M. Rowland's 35-miler, designed by A. W. Crouch, and built by Oscar Van Sant of Atlantic City, N. J. J.M.R. is also powered with a Model F-4 Sterling, a 5¼-inch bore by 6¼-inch stroke, 100 h.p. motor, which, when built for speed, is equipped with an aluminum upper and lower base, and weighs 1,275 pounds complete with electric starter and dynamo. For a high speed motor, rated at 1,400 r.p.m., the Model F is built massively in order to assure its standing up for long runs at that engine speed.

A Necessity in Flying

Complete enjoyment of the newest sport, flying, depends to an unparalleled degree upon practical personal equipment. In no other sport known is the adaptability of clothes to the varied conditions encountered of such importance. The Sanders Co., of Indianapolis, Ind., has been fortunate in having been able to work out the problems of aviation clothes with many of the most experienced air-men of various sections, and many of their suits and hoods have been endorsed and adopted by the United States Government. One of their regulation two-piece suits, made of tan leather, is absolutely water-proof.

A 27-Foot Cruiser

Bonnie, a 27-foot cruiser, shown in one of the pictures on this page, has won the admiration and envy of many Chicago boating fans. She has made more than 1,000 miles this summer, some in the roughest weather when larger boats feared to venture out. Her owner, W. T. Bonfield, is very enthusiastic over her performance and says her 12 h.p. two-cylinder 5 x 6 Anderson engine drives her at 9 m.p.h. and has never missed a shot. Having sleeping quarters for four, a galley, refrigerator and toilet, she is well suited for cruising and has made many interesting trips.

Increasing Demand for Oil Engines

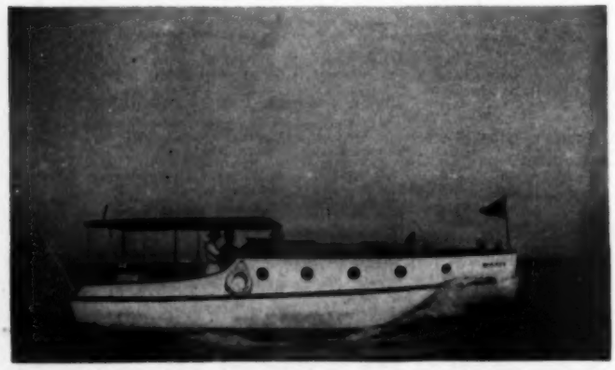
The Jacobson Motor Co., of Saratoga Springs, N. Y., manufacturers of stationary and marine oil engines, are now making a specialty of heavy-duty engines from 5 to 150 h.p. in from one to six cylinders. These engines are especially well suited for fishing vessels and for pleasure boats, cruisers, towboats, and in fact everything that is required for marine work within the sizes mentioned. They are designed to operate on kerosene, distillate and crude or fuel oils; and with gasoline at twenty-five cents per gallon and fuel oil at five cents, it is no wonder that the demand for oil engines is ever increasing.

On account of the extreme simplicity of the Jacobson engine, the few working parts are easily accessible for adjustment without dismantling the engine. Through generously proportioned hand-hole plates in the crankcase and the further removal of the cylinder head, it is possible to take out the piston and connecting rod without disturbing any other part of the engine.

Another interesting feature of this engine is the lubrication which is of a new force-feed arrangement which starts to feed every important working surface when the engine is started to work, and stops when the engine is stopped.

U.S.S.C. Langley, a Seaplane Tender

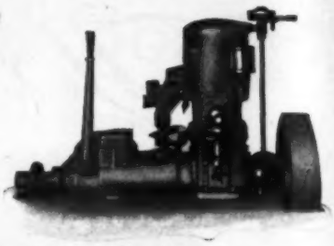
The U. S. S. C. Langley, one of the smaller types of seaplane tenders, recently built for the United States Government by the Chance Marine Construction Co., of Annapolis, Md., from designs by J. Murray Watts, of Philadelphia, shown in one of the accompanying illustrations, is now attached to the aeroplane base at Camp Langley, Newport News, Va. The dimensions are 52 feet over all, 14-foot beam and 3 feet, six inches draft. The power is a six-cylinder Model F, heavy-duty Sterling. The illustration shows plainly the derrick and winch used for handling disabled seaplanes which can be carried on the forward deck. Below this deck in the hold are carried spare parts, oil and fuel supplies, and in the after cabin is a work bench with machine tools for making repairs.



The 27-foot cruiser shown in the above illustration is owned by W. T. Bonfield, of Chicago, Ill. She is powered with a 12 h.p. two-cylinder 5 x 6-inch Anderson engine with which she attains a speed of 9 m.p.h.

Something New in Upholstery

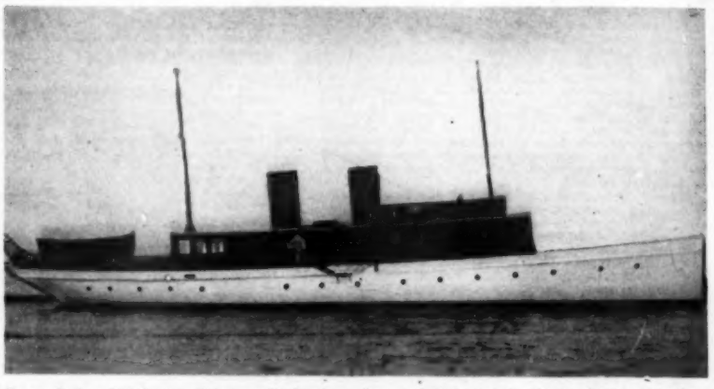
Chase Leatherwove, manufactured by L. C. Chase & Co., of Boston, Mass., is an upholstery fabric with individuality and has a standard place in the textile world. Leatherwove comes in a great many shades, qualities and weights. For wall coverings there are several light weights and harmonious grains, for upholstery heavier weights according to the amount or use it will receive. The various grades run from plain colors to quaint Spanish effects. Two of the most popular grades are known as Leatherwove Galloway and Leatherwove Gibraltar. This fabric is now one of the upholstery materials specified and purchased by the United States Government. It is practically indispensable for ship upholstery, ambulance upholstery and for truck cushions and numerous purposes in connection with the government needs. Leatherwove represents a new departure in upholstery fabrics, for it wears without blistering or cracking, is smart appearing and serviceable.



The 6 h.p. unit plant, brought out by the Caille Perfection Motor Co., of Detroit, Mich., to fill the ever-increasing demand for a motor of this size with built-in gear for boats of from 15 to 20 feet in length

Alaned II, a 24-miler

Alaned II was named after her owners, Al and Ed Schultz, of Beardstown, Ill. She is a fast day cruiser of 40-foot length and 8-foot beam, and has a speed well over the twenty-mile mark. She was built by the Weckler Boat Co., of Chicago, Ill., and was formerly equipped with a six-cylinder motor which drove her 13 m.p.h. This motor plant was later changed to one of the Model F Sterlings, six-cylinder, counterbalanced crankshaft type, which develops 130-145 h.p., and the speed immediately jumped to 24 m.p.h., which is remarkable for this type of boat. There have been several record long distance runs made, notably from Beardstown to Peoria, St. Louis, etc., so that the high speed cannot be said to be merely the result of short trials. Alaned has been running the entire season on the Illinois River so consistently above 20 m.p.h. that she is rarely throttled lower. Her continuous high speed has become an accepted fact, the perfectly-to-be-expected result of stepping on the starter button, and she has had occasion many times to show a little extra spurt in order to leave a hopeful challenger in her wake.



Consuelo is a 110-foot cruising yacht, having a beam of 21 feet and a draft of 5 feet 8 inches, built by Geo. Lawley & Sons Corp., of Neponset, Mass., for J. Percy Bartram, of New York, who is now cruising in her on the Chesapeake. She is powered with two six-cylinder Speedway motors

Kermath Opens Agency at Fort William, Ont.

The Kermath Mfg. Co., of Detroit, Mich., announces the establishment of an agency with the Coslett Hardware Co., of Fort William, Ont., who have ordered their stock of sample motors for display to customers in their territory. This will assure the Kermath engine extremely good representation at this point and assure owners of the finest kind of service.

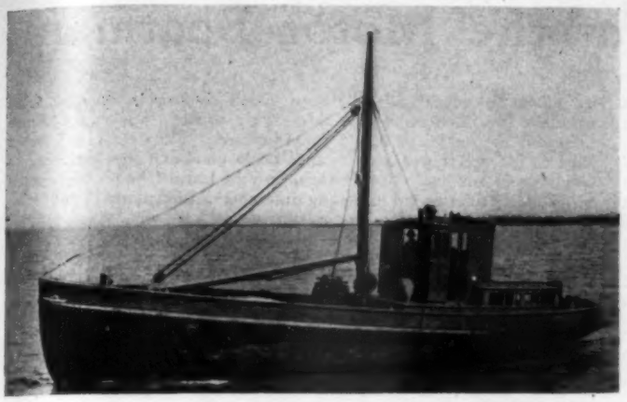
A. D. Altree Resigns from Bosch

Arthur D. Altree, of the Bosch Magneto Co., of New York City, who was their branch manager in Chicago for three and a half years, and who, in the early part of 1914, was transferred to the main office in New York as vice-president, has handed in his resignation, to take effect January 15 next. His experience in the organization and control of credits, sales and service has been very considerable.

Mr. Altree was one of the pioneers in the magneto field, and, still earlier, in the automobile industry, having been the first general manager of the well-

The six-cylinder Frisbie motor with which Comet III, the 20 x 6-foot hydroplane shown in the above illustration is powered, turns an 18 x 28-inch Hyde propeller at 1,680 r.p.m. She is capable of a speed of 40 m.p.h.

Will O The Wisp II, designed by A. W. Crouch and built by the Levare Boat Works, for Oscar Daniels, of New York, is powered with a Model F eight-cylinder Sterling motor which gives her a speed of 36 m.p.h.



U. S. S. C. Langley, a production of the Chance Marine Construction Co., of Annapolis, Md., from design by J. Murray Watts, is now being used at Camp Langley, Newport News, Va.

velt, Assistant Secretary of the Navy, care of Naval Observatory, Washington, D. C. Prompt acknowledgment will be made. Any glasses received that cannot be of real use to the navy will be returned to the sender. It is requested that a tag bearing the name and address of the donor be securely attached to the glasses."

Ship Chandlers Launch

The firm of Bie & Schiott, ship-chandlers, of Philadelphia, Pa., are having a launch built at the yards of John C. Vanderslice at Camden, N. J., from designs by J. Murray Watts, N.A., also of Philadelphia, Pa., for transporting their wares to vessels.

The general dimensions are: length, 35 feet; beam, 9 feet; draft, 3 feet. The propelling engine consists of a 50 h.p. Peerless motor with four cylinders, having a 5¾-inch bore by 7-inch stroke, starting on gasoline, and capable of running on kerosene.

The general arrangement shows an engine-room amidships with the pilot house forward, raised up so as to give a good view back over the engine-room trunk. On top of the trunk is a bridge-deck railing, making a convenient place for lookout, or for hailing steamers coming alongside. On the forward deck is a hatch leading into the forward cargo hold, and aft there is a big cockpit 11 feet long, for passengers and package freight. The boat is of unusually heavy construction, the keel and framing being of oak, the frames in the engine-room being 6-inch centers.

The hull is heavily sheathed to a foot above the load waterline with metal, as a protection against ice, and heavy oak guards covered with half oval galvanized iron give ample protection when lying alongside vessels or the dock. In spite of the heavy construction, the guaranteed speed is 12 m.p.h.

Navy Asks Public for Loan of Spyglasses

The Navy Department has issued another appeal to owners of German or other high-grade spyglasses, telescopes, camera lenses, and binoculars to enlist them for the service of the navy for the period of the war. Under the law these cannot be accepted free of charge, and for that reason it has been decided to pay a dollar for each glass accepted.

The appeal of the navy for these glasses took the form of the following announcement by the Navy Department:

"The Navy Department has received the following letter:

"'I herewith send you a field glass, wishing to contribute my mite. I hope it may be of service on one of the patrol cruisers, and aid in finding some German submarine. Will be glad to know it can be put in service. Respectfully,

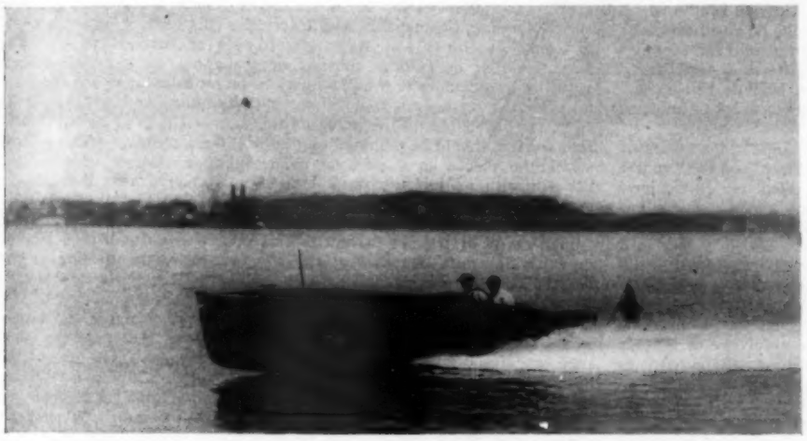
"'J. F. HEFFLEBOWER,
"'Sawtelle, Cal.'

This letter has suggested to the Navy Department the availability of a large number of binoculars, spyglasses, and telescopes now in private hands throughout the country.

The navy is in need of binoculars, spyglasses, and telescopes. It is a well known fact that up to very recently the United States imported practically all lenses for the better class of observation glasses, and even now the American facilities are not adequate to supply the greatly increased demands for use on the hundreds of new ships which are being placed in commission. It must be borne in mind that every ship of the navy and merchant marine requires many more men on lookout than heretofore.

"It is believed that many owners would gladly turn them over to the Government for use in the war. It makes little difference how old these glasses are, as long as they are in serviceable condition.

"As the Government cannot accept property or service without compensation, one dollar will be paid for each glass accepted. They should be forwarded direct to the Hon. Franklin D. Roosevelt, Assistant Secretary of the Navy, Washington, D. C."



Sterling II, powered with a Model FS, four-cylinder Sterling, makes a speed of 34 m.p.h. She was designed by A. W. Crouch and built by the Leyare Boat Works. She is 26 feet long by a beam of 5 feet and is of the V-bottom design

A Testimonial Letter

One of the accompanying illustrations shows a yacht in the Harbor of Callao, Peru, equipped with a four-cylinder 12-15 h.p. Model F Gray motor, the owner of which writes to the Gray Motor Company as follows:

"The motor I purchased from you has given perfect satisfaction, running now every day for four months without a stop and is as silent as the finest motor car."

The owner reports the speed as 12 knots per hour, which we consider exceptionally good for a boat powered with a motor rating only 15 h.p.

(Continued on page 74)

W. Loomis is the owner of the runabout shown in the above photograph. Powered with a 12-15 Model F Gray motor made a speed of 12 knots on her trial runs. She is used at Callao, Peru

Personalities

E. B. Blakely

Seventeen years of intense activity seem to have characterized the business life of E. B. Blakely, of Sears, Roebuck & Co., Chicago, Ill., and his vital energy has brought results.

In 1901 he entered the employ of the Woods Motor Vehicle Co., of New York, where he was placed in the storage battery department. In 1902 he opened a garage of his own in New York with a branch at Newport, R. I., a business which he lost in 1903 through a dishonest partner. Then he spent a year as chauffeur for E. E. Smathers, touring abroad and in this country. On his return he opened a garage at Beverly, Mass., giving this up to become a designer of automobiles for the Haynes Automobile Co., at Kokomo, Ind.

E. B. Blakely

In 1907 Mr. Blakely became superintendent of the Ardsley Motor Car Co., of Yonkers, N. Y., and in 1908 superintendent of the testing departments of the Daimler Manufacturing Co., of Steinway, L. I. He also designed and drove a racing car for them at Ormond Beach, Fla., where he won six cups and a speed medal.

During 1909 he was inspecting engineer at the Electric Vehicle Co., of Hartford, Conn. Next he taught physical training for a year at the DeWitt Clinton High School in New York, and gave an evening course in gas engine practice at the Y. M. C. A.

In 1911 he was field expert and foreman of the repair department for the International Harvester Co., of Milwaukee. In January, 1912, he resigned his position with the International Harvester Company, and became consulting engineer of the gasoline engine department of Sears, Roebuck & Co., of Chicago, Ill. He was later made chief engineer of their gas engine factory at Sparta, Mich., and still later became superintendent of this plant.

When this plant was moved from Sparta, Mich., to Evansville, Ind., Mr. Blakely resigned and went into business for himself at Muskegon, Mich., manufacturing a rowboat motor which he invented and patented. This venture was not a success financially, as he did not have sufficient capital behind him to operate on a scale large enough to make it worth while, so he sold his patents and returned to the employ of Sears, Roebuck & Co., Chicago, Ill., where he is now advisory engineer of the gasoline engine department, and is at present working on the development of a new type of oil engine, which seems to promise to revolutionize entirely certain branches at least of the internal combustion engine business.

J. H. Culver

J. H. Culver

J. H. Culver, sales manager of the Roberts Motor Mfg. Co., of Sandusky, O., has been engaged in mail-order advertising and selling for eighteen years. He has had several years of successful experience in the motor field, having originated and conducted selling and advertising campaigns for marine and stationary engines, as well as for boats, for many years.

While he has been connected with many prominent companies, most of his experience has been gained by conducting mail-order ventures of his own, with which he has met with universal success.

In his present position he has reorganized the selling policy of the Roberts Company, has carried on an aggressive advertising campaign in this country and abroad, opened export offices in New York City, and has made the Roberts a real factor in the motor field.

Mr. Culver is about forty years of age, a Michigan man and an enthusiastic booster for MoToR BoatinG as an aid in business building.

Practical Navigation for the Motor Boatman

(*Continued from page* 23)

the number of points at the foot of the page, finding the distance in the column footed "Dist." and taking the difference of latitude from the column which has "Lat." printed at its foot and the departure from the column which has "Dep." printed at its foot. It will be noticed that the column that is a "Lat." column when reading from the top of the page is a "Dep." column when reading from the bottom. It is a very common mistake with beginners to take the difference of latitude from the "Dep." column when working with more than a four-point course and this mistake the reader should guard against. A couple of examples may make this clearer: Find the difference of latitude and the departure for a course NE½N distance 25 miles. NE½N is a 3½-point course and in table 1 will be found on page 528; opposite 25 in the distance column on this page 19.3 miles will be found in the "Lat." column and 15.9 in the "Dep." column. Another example: Find the difference of latitude and departure for a course SW½W distance 281 miles. SW½W is a 4½-point course and 4½ points is found in table 1 at the bottom of page 528, the "Lat." and "Dep." of the course will be found to be 178.3 miles and 217.2 miles respectively. Table 2 is just like table 1 except that the courses are given in degrees and distances up to 600 miles may be handled. Courses up to 45° are found from the tops of the pages, and courses from 45° to 90° from the bottoms. Courses of over 90° on the new navy compass card will be found in parenthesis at the top or bottom of the pages, depending upon whether the course lies less or more than 45° from North or South. One example of the use of table 2 follows: Find "Lat." and "Dep." for a course 76°, distance 412 miles. The reader will find 76° at the foot of page 559, the "Lat."=99.7 miles and the "Dep."=399.7 miles. A mathematical discussion of the meaning of all these terms has been purposely avoided here because such a discussion can be found in Chapter V of Bowditch and that chapter should be carefully read. It is hoped, however, that the reason for calling the number of miles of northing or southing made on a course the "difference of latitude" will have occurred to the reader. The minute of latitude being equal to the nautical mile causes the northing or southing in miles to be equal to the difference of latitude in minutes.

Figure 5 shows how the various "Lats." and "Deps." of a series of courses can be combined to give the "Lat." and "Dep." of the "course and distance made good" as the single course is called that would have taken the vessel to the same place that her actual zig-zag course has taken her to. This computation is called working a traverse and is done by setting down the courses, compass errors, and distances in a table like that shown. The true courses are obtained from the compass courses and the "Lat." and "Dep." of each course is then looked up in the traverse tables and entered in the prepared table as shown in Figure 5. Adding the north "Lats." and then the south "Lats." and subtracting the lesser of these sums from the greater gives the difference of latitude of the "course made good" and a similar treatment of the departures gives the departure of this course. The course and distance made good is found by searching in table 2 for a place where the difference of latitude made good occurs alongside the departure made good. When this place in the table is found the distance can be taken from the distance column and the course from the head or foot of the page. It will facilitate matters if it be remembered that when the difference of latitude is greater than the departure, the course is less than four points or 45°, while if the departure is the greater the course is more than four points. It should also be borne in mind that an exact coincidence of the "Lat." and "Dep." made good is not likely to be found in the traverse tables, but the closest obtainable coincidence must be found and the corresponding course and distance made good adopted.

To find the new position requires the use of what is called middle latitude sailing. The fact has already been brought out that the number of nautical miles of northing or southing made good is also the number of minutes that the latitude has been changed, and it therefore only remains to find out from the number of miles of easting or westing made good how much the longitude has been changed. In the problem accompanying Figure 5 this is all illustrated. The difference of latitude is changed from minutes to degrees *and* minutes by dividing by sixty and this difference of latitude is then applied to the old latitude and the new latitude of the vessel obtained. If the equator is approached the difference of latitude is subtracted from the latitude left and vice versa. Having found the new latitude it is next necessary to find the middle latitude of the course made good, or the latitude of the middle of this course, for this data will be needed in order to find the difference in longitude. The middle latitude is found by adding the new and the old latitudes together and dividing the sum by two. Some people prefer to look upon this as the average latitude in which the sailing was done. To find the difference in longitude after getting the middle latitude simply look for the page in table 2 which has the middle latitude to the nearest degree printed on it as a course then find the nearest possible value to the departure made good in the "Lat." column and the difference of longitude in minutes can be taken from the Distance column. The difference of longitude in minutes is then converted to degrees and minutes by dividing by sixty and the result applied to the old longitude, subtracting if the meridian of Greenwich is approached. The result will be the longitude of the ship.

To the casual reader this all seems hopelessly complicated, but those who take Bowditch and follow through the problem worked in connection with Figure 5 will find it simple enough. Most beginners find it hard to get the course and distance made good and the difference of longitude in minutes. The first can only be learned by practice, but it will simplify things a lot in getting differences of longitude if the beginner will remember that in finding this quantity by the middle latitude method the courses at the tops and bottoms of the pages in table 2 are middle latitudes to the nearest degree, the distance column is a column of differences of longitude in minutes and the "Lat." column a column of departures of the course made good. For those mathematically inclined the reason underlying this change of names of the columns is fully explained on page 75 and 76 of Bowditch.

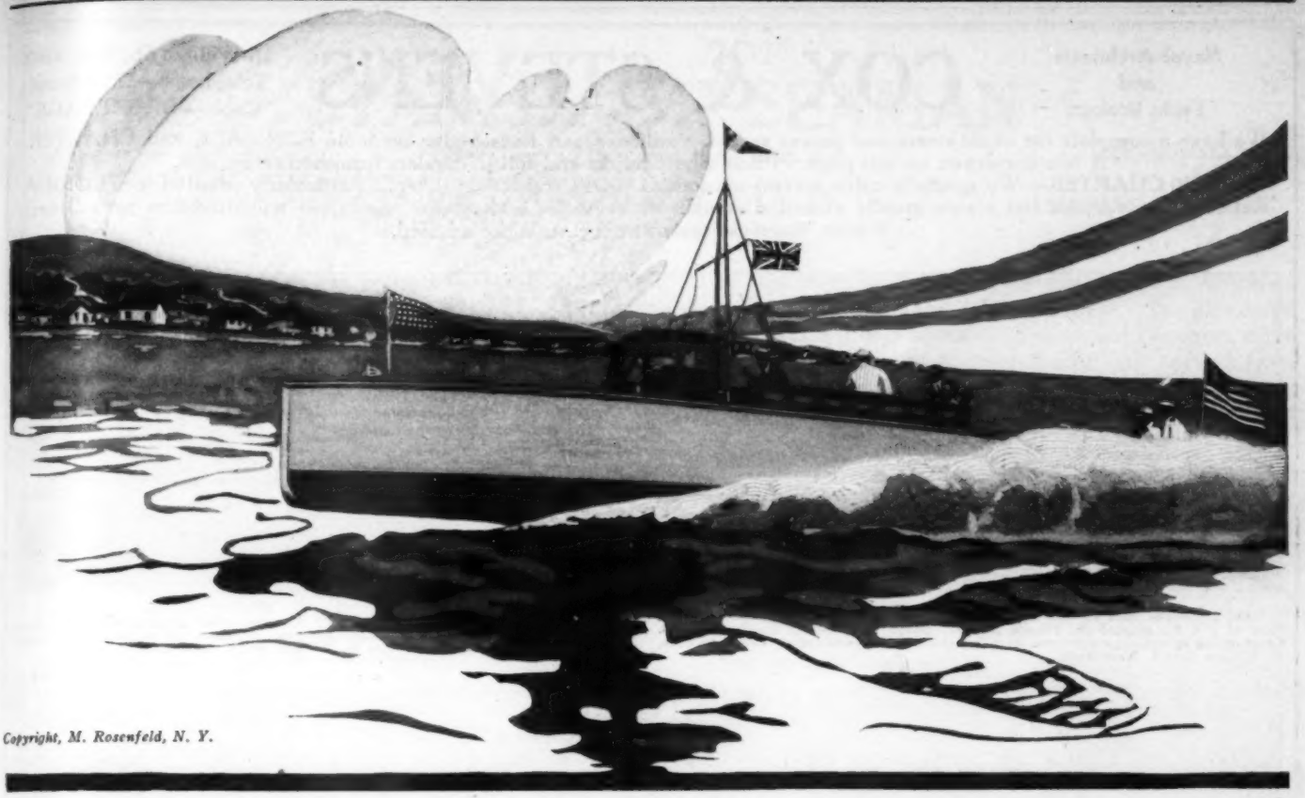
When only one course is sailed the finding of the new position by middle latitude is much simplified as the course sailed is the course made good and there is only one difference of latitude and one departure. The middle latitude method of finding the difference of longitude remains the same. Problem 2 illustrates this. When a course turns out to be either due East or West the work is still further simplified as there is no difference of latitude and the middle latitude is naturally the latitude in which all the sailing was done and is the latitude from which the ship started. Problem 3 illustrates this extremely simple problem of parallel sailing or sailing along a parallel of latitude.

Thus far the cases considered have been those of a ship leaving a certain location whose latitude and longitude is known. In many cases this is not done but the vessel takes departure from a lighthouse or other aid to navigation whose position is known. When this is done the bearing of the fixed object is taken with the sight vane—see previous article—or with a bearing finder such as is described in Practical Motor Boat Handling, Seamanship, and Piloting. This bearing finder is really a form of pelorus and is an exceedingly useful instrument. The bearing finder or pelorus consists of a dumb compass card—a card which has no needles in it and which can be set to point in any direction by placing it in a desired position with the hand—and some form of sight vane mounted on the card. If the instrument is to do very accurate work it should be mounted on gimbals like a compass. The pelorus should be placed in a position commanding an entire view of the horizon with its lubber's mark located on a line drawn through the center of the instrument parallel to the center line of the boat. To use the instrument the compass course of the boat is noted and the "dumb card" of the pelorus set to this course, the dumb card is now in a position just like that of the compass card and as long as the vessel's course remains unchanged, compass bearings of objects may be taken with the sight vane of the pelorus. It should occur to the reader that the pelorus is really more convenient than the sight vane as the dumb card can be set for the true course of the vessel and thus true bearings can be taken directly from the pelorus. The use of the simple bearing finder is well illustrated in Practical Motor Boat Handling, Seamanship, and Piloting and a description of a more elaborate type of pelorus will be found on page 19 of Bowditch. The pelorus merely gives the direction from the ship to the object from which the departure is being taken. The distance to the object must be obtained by other means which will be described later, but when the distance is obtained it is a simple matter to reverse the bearing and work this course and distance as the first course of the traverse.

The idea of all this is to begin the computation of dead reckoning from a fixed object whose latitude and longitude are known and work the course and distance from this point to the position of the ship when she takes departure as the first course of the traverse. The method of procedure is illustrated by problems four and five. In problem four the departure was taken with a pelorus and the bearing of the light is a true bearing while in problem five the departure was taken with a sight vane on the standard compass and the bearing has to be corrected for variation and the deviation of the compass on the course upon which the vessel was when the departure was taken. In both problems four and five allowance has been made for current. This is done in exactly the same way it was done in problems worked graphically: by inserting a course in the traverse whose direction is the direction of flow of the current and whose length the distance the current has run while the vessel was affected by it.

It remains to learn how to get the distance to a fixed object from which a departure is being taken. The simplest way of doing this is by the well-known "four point bearing". In order to take a four point bearing it is merely necessary to read the log when the object is four points off the bow and keep the vessel on the same course until the object bears abeam when the log is again read. The distance run between the taking of the bearings will be distance to the light when the light was abeam. Another convenient method which is not quite so accurate as the four-point bearing is to take the distance run from when the object bears two points off the bow to when it bears four points off the bow. The distance run will be the distance from the light when the second bearing is taken and the light will be passed abeam at approximately 7/10 of this distance. A still less convenient method is to take any two bearings of the light which vary more

(*Continued on page* 106)



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Dauntless, latest War Speed-Boat, Is Valsparred—

The *Dauntless* is now "S. P. 1002," Home, Newport, R. I. She was built for Mr. Roy T. H. Barnes, of Hartford, Connecticut, for the sole purpose of offering her to the Government as a despatch boat, and is now under charter for the duration of the war for $1 a month.

During the official Government test she made over twenty-seven miles in one hour, and over a measured course of one and a quarter statute miles made a record of two minutes and nine seconds, which is at the rate of thirty-five miles an hour.

Dauntless, is Valsparred. Mr. Ernest N. Way, designer of *Dauntless*, knew that Valspar can be depended upon for hard wear in all-weather cruising such as is required of boats of this class.

Valspar is preferred by owners and builders of speed-boats, cruisers, sailboats and rowboats because it is water-proof, weather-proof, and will not turn white in water—fresh or salt, hot or cold. It is a long-oil varnish, which means that it remains always tough and elastic. It dries dust-free in two hours and hard in twenty-four hours.

If you have never used Valspar on your boat, you have never tasted the full joys of care-free boating. Valspar is used by leading steamship lines and builders throughout the country. It has earned its place by sheer merit.

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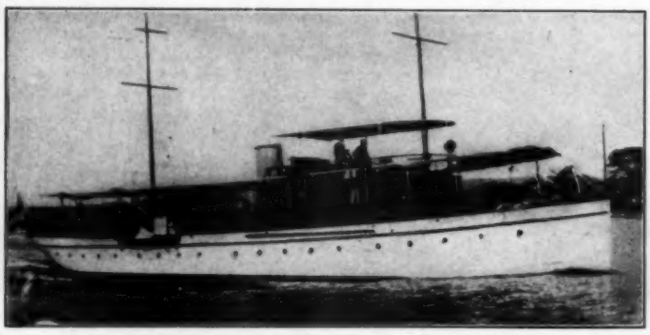
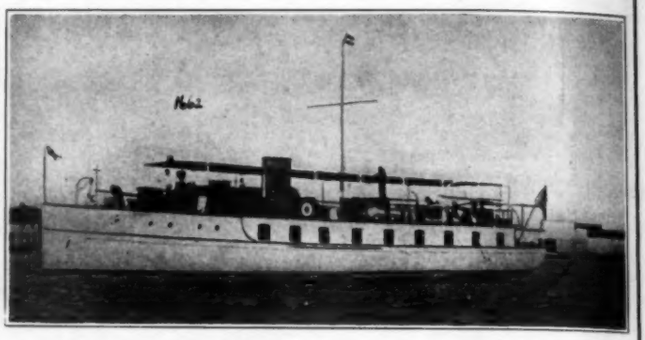
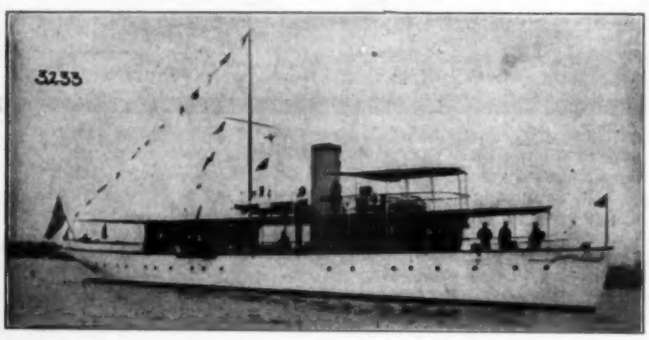
WINTER CHARTER—We specially offer several modern GASOLINE HOUSEBOATS particularly adapted for FLORIDA waters. The demand last season greatly exceeded amount of available craft; these conditions will doubtless prevail next Winter, therefore early arrangements are advised.



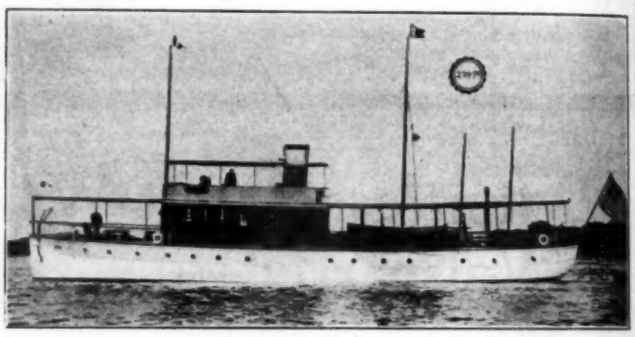
No. 1796—For Sale or Charter—Very roomy, twin screw cruising power yacht, 99 x 17 x 4 ft., adapted for Florida service. Speed 12-14 miles; Standard motors. Large dining saloon, six staterooms, three bathrooms; all conveniences. Cox & Stevens, 15 William Street, New York.



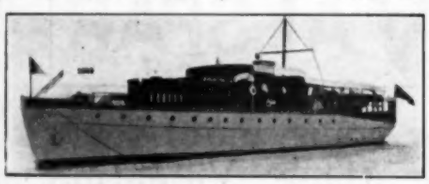
No. 1662—For Charter—Attractive 90 ft. twin screw gasoline houseboat; speed 10-12 miles. Large saloon, four staterooms, two bathrooms; all conveniences. Handsomely furnished. Cox & Stevens, 15 William Street, New York.



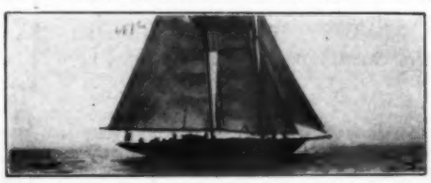
No. 3233—For Sale or Charter—Particularly desirable 123 ft. steel yacht. Speed up to 17 miles. Recent build. Dining saloon and social hall on deck; five staterooms, two bathrooms, etc. Cox & Stevens, 15 William Street, New York.



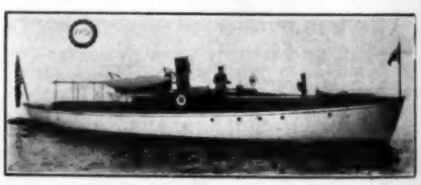
No. 2247—For Sale or Charter—90 ft. twin screw power yacht. Speed 12-14 miles. Dining saloon on deck; main saloon, three staterooms, two bathrooms, etc. Particularly able craft. Cox & Stevens, 15 William Street, New York.



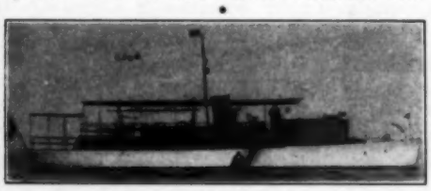
No. 2888—For Sale—Twin screw Diesel power yacht; 110 x 18 x 6 ft. Speed 12-14 miles; two 150 H.P. 6 cyl. Craig-Diesel motor. Dining and main saloons; four staterooms, bath, four toilets, etc. Very economical to operate. Cox & Stevens, 15 William Street, New York.



No. 647—For Sale—Modern, flush deck, light draught, auxiliary schooner yacht, 106 x 75 x 24.6 x 5.6 ft. Speed under power 9 knots. Large saloon, three staterooms, two bathrooms, electric lights, hot water heating plant, etc. Cox & Stevens, 15 William Street, New York.

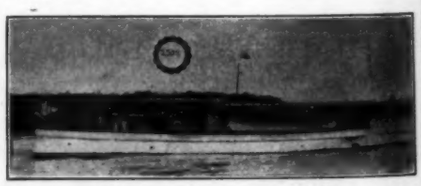


No. 1470—For Sale—67 ft. bridge deck power boat. Speed 14-16 miles; 100 H.P. 6 cyl. Standard motor. Cabin with two transoms, toilet, galley, etc. Large cockpit. Adapted for day service. Cox & Stevens, 15 William Street, New York.

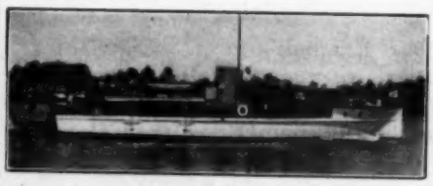


No. 1130—For Sale—Gasoline cruiser, 70 x 13.6 x 3.6 ft. Speed 11-13 miles; 6 cyl. Winton motor. Dining saloon, three staterooms, bath, main saloon, etc. In commission. Low figure accepted. Cox & Stevens, 15 William Street, New York.

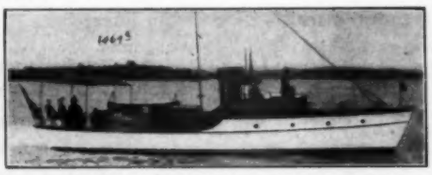
No. 1681—For Sale or Charter—Modern, shoal draft, twin screw gasoline houseboat; 70 x 16.9 x 2.6. ft. Speed 10-11 miles; two 30-45 H.P. Sterling motors (new 1915). Large main saloon, three double staterooms, bath, three toilets, in addition to deck saloon. Independent electric lighting and hot water heating plants. Low figure accepted by Estate for prompt sale. Cox & Stevens, 15 William St., New York.



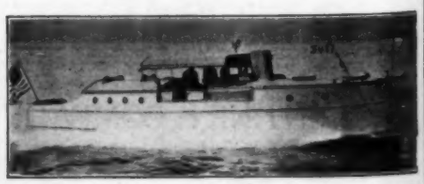
No. 2508—For Sale—Smart, fast 65 ft. power boat. Speed up to 16 miles; 100 H.P. 6 cyl. Standard motor. Dining saloon forward; double stateroom, toilet, etc., aft. Large after deck. Low price. Cox & Stevens, 15 William Street, New York.



No. 3490—For Sale—High speed, twin screw cruiser; 60 x 10.6 x 3 ft. Built 1917. Speed up to 25 miles. Double stateroom, saloon, two toilets, electric lights, etc. Pilot house has three transom seats and engine controls. Offer desired. Cox & Stevens, 15 William Street, New York.



No. 1469—For Sale—Modern bridge deck cruiser; 52 x 11 x 4 ft. draught; 25/35 H.P. Standard Motor; speed 11 miles. Double stateroom, saloon, galley, toilet room, etc. Interior finish African mahogany throughout. Bargain for quick sale. Cox & Stevens, 15 William Street, New York.



No. 3481—For Sale—Practically new, high speed bridge deck cruiser; 50 x 11.3 x 2.9 ft. Speed up to 24 miles, 200 H.P. Van Blerck motor. Double stateroom, saloon, electric lights, etc. Handsomely finished. Cox & Stevens, 15 William Street, New York.

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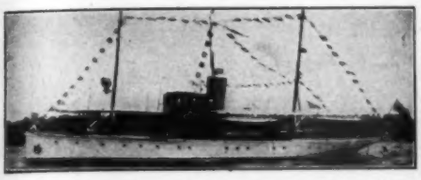
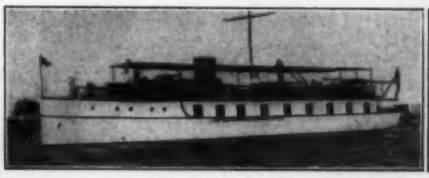
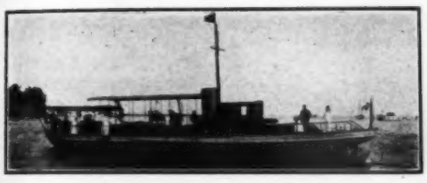


7920—95 ft. Seagoing Cruiser. All conveniences. The best craft of character available. Stanley M. Seaman, 220 Broadway, New York.



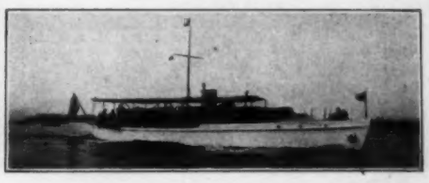
8727—For Charter—90 ft. Twin Screw Cruiser. 4 staterooms; 2 baths. Speed 10-12 miles. Stanley M. Seaman, 220 Broadway, New York.

8804—For Charter—Brand new 85 ft. Houseboat; attractive terms; inspectable Florida. Stanley M. Seaman, 220 Broadway, New York.

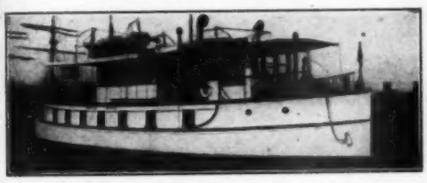


8725—Shoal draught 83-foot Coast Cruiser. Fine accommodations. Ideal for Florida waters. Stanley M. Seaman, 220 Broadway, New York City.

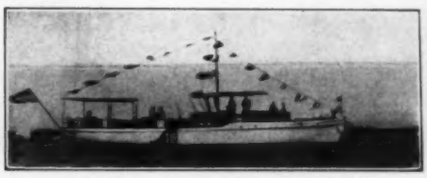
8786—The finest 72 ft. Twin Screw Cruiser offered. In commission. Speed 13 miles. Low price. Stanley M. Seaman, 220 Broadway, New York.



8747—This Twin Screw 70 footer is offered at low price. Condition good as new. Stanley M. Seaman, 220 Broadway, New York.



8613—For Charter—68 ft. twin screw Florida cruiser; fine accommodations. Speed 9 knots. Stanley M. Seaman, 220 Broadway, New York.

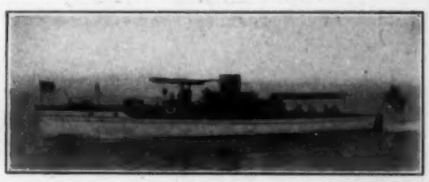


8757—69 ft. Twin Screw Lawley cruiser, available at bargain price. Stanley M. Seaman, 220 Broadway, New York.

8787—62 ft. Seagoing Cruiser. Speed 11 miles. Bargain. Stanley M. Seaman, 220 Broadway, New York.

8767—Brand new 60 ft. Express cruiser; speed 24 miles. Stanley M. Seaman, 220 Broadway, New York.

8771—60-foot Coast Cruiser. 2 staterooms. Bath. New engine. Low price. Stanley M. Seaman, 220 Broadway, New York City.

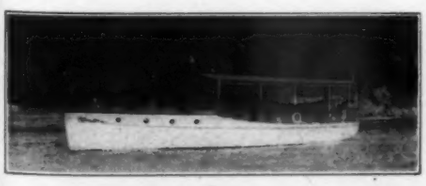


8779—60-foot Twin Screw Express Cruiser offered at bargain. New engines. Speed 20 knots. Stanley M. Seaman, 220 Broadway, New York City.

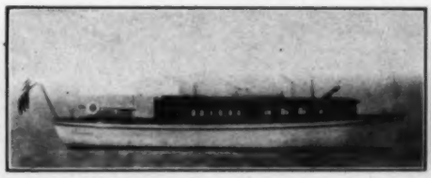
8765—55-footer with 2 staterooms; able cruiser. Stanley M. Seaman, 220 Broadway, New York.

8646—Immediate sale desired of this able 55 footer. Stanley M. Seaman, 220 Broadway, New York.

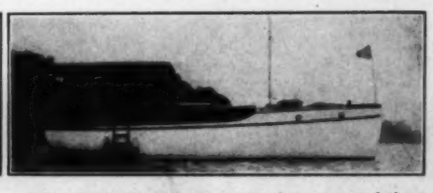
8752—Exceptionally fine 50 footer: speed 11 miles. Low price. Stanley M. Seaman, 220 Broadway, New York.



8777—45 ft. ELCO-de-Luxe Cruiser; good as new. Low price. Stanley M. Seaman, 220 Broadway, New York.



8744—Well known 40 ft. "Sea Rover" cruiser; 20th Century motor; bargain. Stanley M. Seaman, 220 Broadway, New York.



8802—Practically new 35 footer; fine accommodations; 4 cycle motor. Stanley M. Seaman, 220 Broadway, New York.

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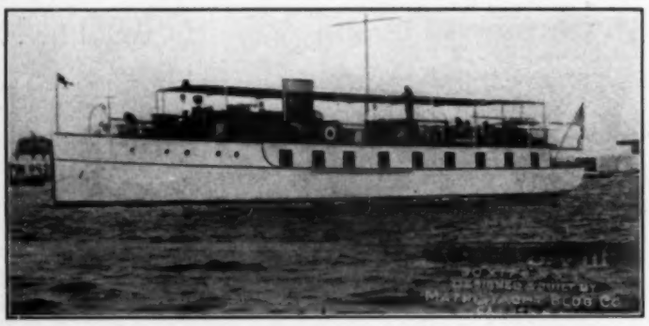
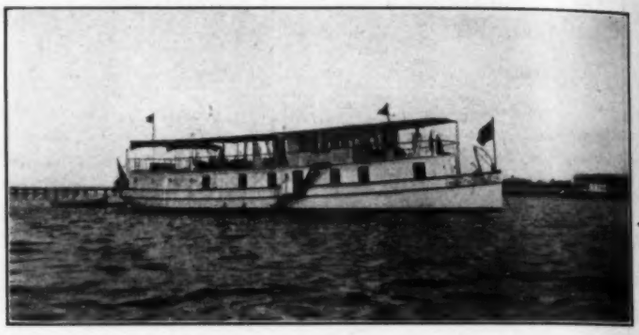
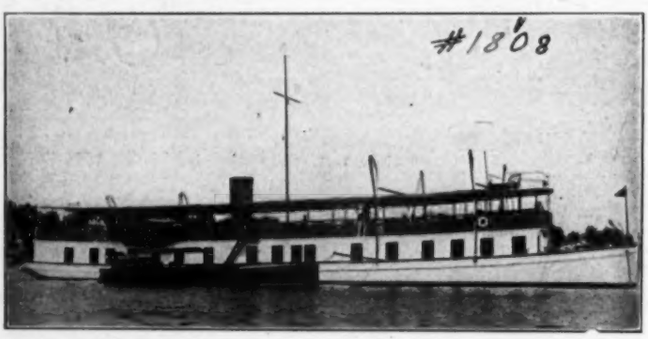


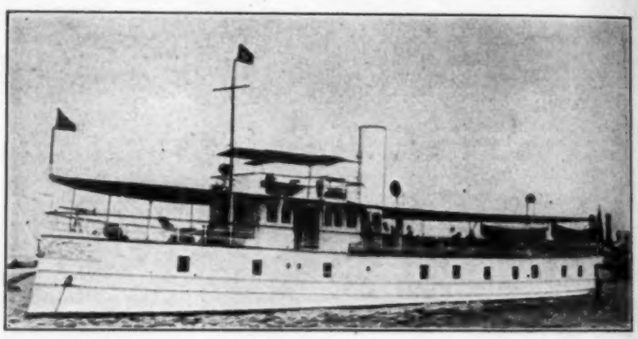
No. 1865—Exceptional opportunity to charter one of the best houseboats available. 90 ft. over all, 17 ft. 6 in. beam and 3 ft. 6 in. draft. 3 staterooms, maid's room, 2 bathrooms and dining saloon.



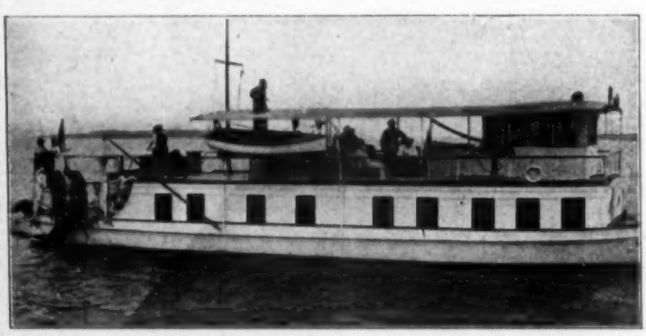
No. 1820—Charter—Desirable houseboat in southern waters, 103 ft. x 20 ft. 4 in. x 3 ft. draft. 4 staterooms, 2 bathrooms, dining saloon and large sitting room.



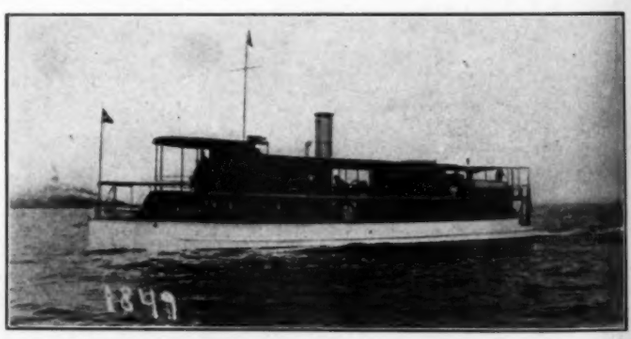
No. 1808—Sale—Charter—Now at Miami. Admirably suited for Florida waters. 125 ft. x 17 ft. 8 in. x 3 ft. 4 in. draft. 4 staterooms, 2 bathrooms, very large dining saloon, ice machine, etc.



No. 243—Sale—Charter—Twin screw steam houseboat, 116 ft. x 21 ft. x 4 ft. draft. 4 staterooms, 3 bathrooms, dining saloon and smoking room.

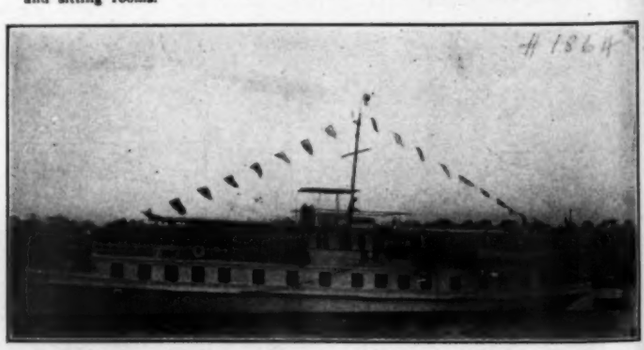


No. 1860—Charter—Shallow draft twin screw houseboat, 70 ft. x 18 ft. 6 in x 18 in. draft. 3 staterooms, bathroom, dining saloon and pilot house.



No. 1849—Charter—Desirable houseboat, 115 ft. x 17 ft. x 3 ft. 6 in. draft. Speed 12 miles. 5 staterooms, 3 bathrooms, main saloon, dining saloon, smoking and sitting rooms.

No. 1847—For Charter—Houseboat now in Florida waters, 85 ft. x 18 ft. x 28 in. draft. 4 staterooms, bathroom, large dining saloon, sitting room, etc.



No. 1864—Charter—Now in Florida waters. Modern houseboat, 110 ft. x 20 ft. x 4 ft. 9 in. draft. 4 Staterooms, dining saloon, sitting room, etc.

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FOR SOUTHERN CRUISING this Winter we offer a number of very desirable POWER HOUSE BOATS and POWER YACHTS which are specially adapted for FLORIDA waters. Last season a great number of clients were much disappointed in not being able to secure for charter a suitable POWER HOUSE BOAT or POWER YACHT owing to the great demand. Yachting this coming WINTER SEASON promises more activity than ever before—so—CHARTER A BOAT NOW AND BE ASSURED OF ONE THIS WINTER.

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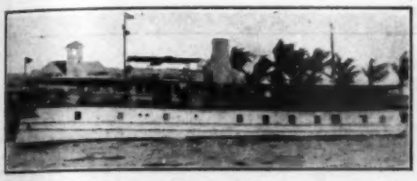
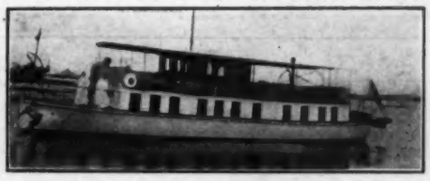
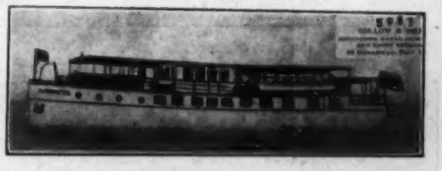


No. 1234—For Sale and Charter—Attractive 116 foot twin screw houseboat. Ideal for Northern and Southern waters. Gielow & Orr, 52 Broadway, New York City.



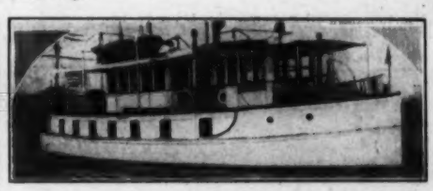
No. 3491—Offered by Estate—Twin screw power houseboat 69 feet. Sterling engines. Three staterooms. Very successful craft. Now in Florida. Gielow & Orr, 52 Broadway, New York City.



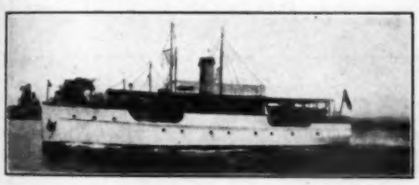
No. 5987—For Sale and Charter—65 foot power houseboat. Now in Florida waters. Five staterooms. Desirable for Winter cruising. Gielow & Orr, 52 Broadway, New York City.

No. 5403—For Sale and Charter—Popular 51 foot cruising power houseboat. Standard motor. Four staterooms. Boat well kept up, suitable for Florida cruising. Gielow & Orr, 52 Broadway, New York City.

No. 5974—For Sale and Charter—Available for Winter season in Florida, 64 foot twin screw houseboat. Now in South. Accommodations good. Gielow & Orr, 52 Broadway, New York City.

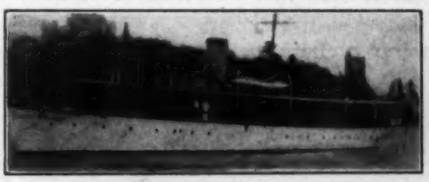


No. 4747—For Sale—68 foot twin screw power houseboat. Standard motors. Two double staterooms. Now in Florida waters. Gielow & Orr, 52 Broadway, New York City.

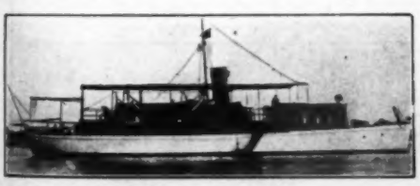


No. 6021—For Sale and Charter—Ideal for Florida cruising 71 foot power yacht. Very roomy. Built 1917. Three double staterooms. Gielow & Orr, 52 Broadway, New York City.

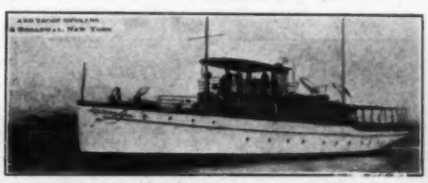
No. 5532—For Sale and Charter—Comfortable and roomy 62 foot power houseboat. Good accommodations. Now in Florida waters. Available for Winter. Gielow & Orr, 52 Broadway, New York City.



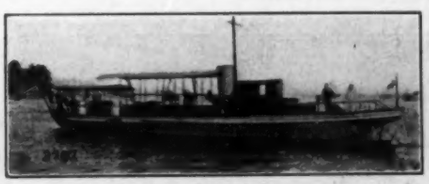
No. 5616—For Sale—Handsome 122 foot steel steam yacht. In fine condition. Excellent accommodations below deck. Gielow & Orr, 52 Broadway, New York City.



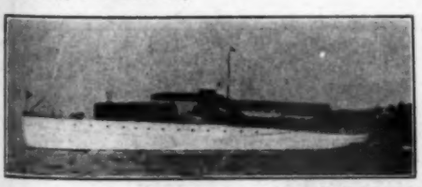
No. 3106—For Sale and Charter—Located in Southern waters, 70 foot cruising power yacht, Winton motor. Two staterooms, well fitted and furnished. Gielow & Orr, 52 Broadway, New York City.



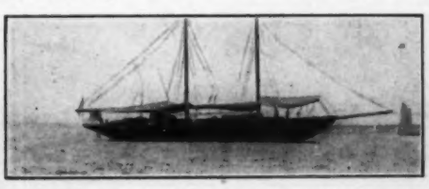
No. 4368—For Sale—Well appointed 110 foot steel twin screw, raised deck power yacht. Sterling motors. Six staterooms, two bathrooms. Gielow & Orr, 52 Broadway, New York City.



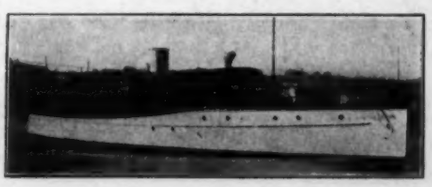
No. 2707—For Sale—83 foot cruising power yacht. Ideal for Florida waters. Gielow & Orr, 52 Broadway, New York City.



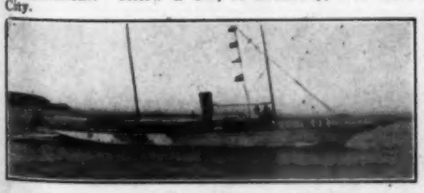
No. 5922—For Sale—Successful 110 foot twin screw Diesel heavy oil engine power yacht. Heaviest construction throughout. Thoroughly overhauled 1917. Good accommodations. Gielow & Orr, 52 Broadway, New York City.



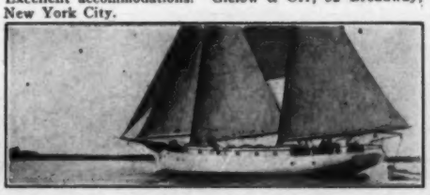
No. 2980—For Sale—106 feet x 75 feet x 24 feet 6 inches x 5 feet 6 inches popular auxiliary centerboard schooner; handsomely fitted and furnished. Boat well taken care of. Excellent accommodations. Gielow & Orr, 52 Broadway, New York City.



No. 5489—For Sale and Charter—Now in Florida, 72 foot twin screw fast cruising yacht. Speedway motors. Fine accommodations. Gielow & Orr, 52 Broadway, New York City.



No. 232—For Sale—Attractive, well furnished, 145 foot steel steam yacht. Roomy and comfortable. Good sea boat. Gielow & Orr, 52 Broadway, New York City.



No. 5938—For Sale and Charter—76 foot auxiliary centerboard bugeye schooner, suitable for Florida cruising. Well ventilated and very roomy. Gielow & Orr, 52 Broadway, New York City.

No. 858—For Sale and Charter—Roomy and comfortable 125 foot twin screw power houseboat. Five double staterooms. Now in Florida waters. Available for Winter season. Gielow & Orr, 52 Broadway, New York City.

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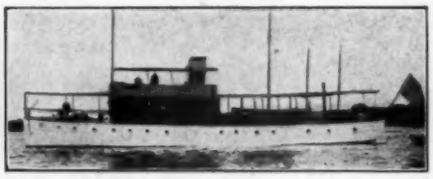
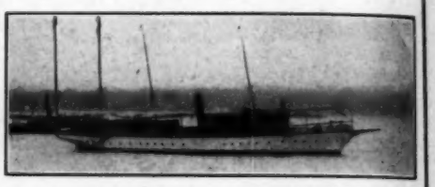
No. 1937—Diesel Power Yacht, 110 x 18, two 6 cylinder 150/180 H.P. engines, low fuel cost.



No. 1821—Flush Deck, Power Yacht 90 x 15.3, two 60 H.P. motors, 3 staterooms, etc.



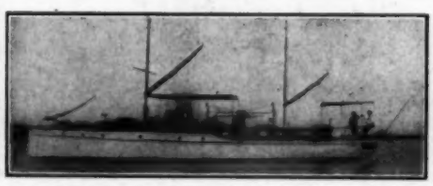
No. 2381—Flush deck, 105 ft. Power Yacht, 100 H.P. motor installed 1915, sleeps 10-12 people. Low price.

No. 924—Power Yacht, 92 ft., 100/125 H.P. 20th Century motor, splendid deck space.

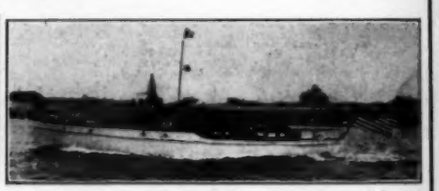
No. 1585—Power Yacht, 91 x 15.7, staunch construction, flush deck, two 6-cylinder motors, good speed.

No. 948—Power Yacht, 91 x 12.6, two 125 H.P. motors. Low price.

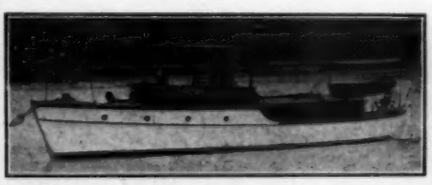
No. 1738—Raised Deck Cruiser, 65 x 11, six cylinder motor, good accommodation.



No. 1959—Exceptionally able seaboat, 64 ft., two staterooms, bath, etc., in commission.



No. 1629—Sale—Charter. Splendid cruiser, 60 x 11.6, Murray & Tregurtha kerosene motor, A-1 condition.



No. 1700—Bridge Deck Cruiser, 52 x 11, Standard motor, with deck controls.

No. 1625—Modern Cruiser, 60 x 13, six cylinder Standard motor.

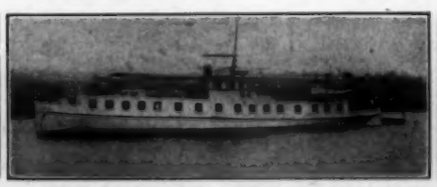
No. 1370—First-class Cruiser, 55 x 11, six cylinder Standard. Speed 12 miles.

No. 2343—Sale—Practically new, twin screw 60 ft. express cruiser, Sterling engines, speed 22 miles.

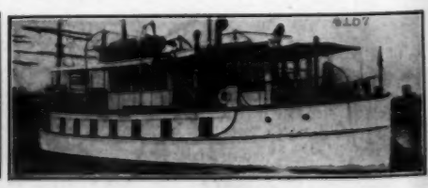
No. 2314—Express Cruiser, 50 x 11.3, Van Blerck 200 H.P. motor, speed 22 miles.

No. 2355—Bridge deck cruiser, 45 x 9.6, Lamb motor, 24 H.P.; quick sale desired.

No. 2016—Semi-Houseboat, 40 x 13.6, double stateroom, saloon, etc.



No. 39—Charter; Florida waters, Power Houseboat 110 x 20, two 75 H.P. Murray & Tregurtha motors.



No. 58—Sale—Charter. Florida Houseboat 68 x 20.9, draft 30 inches; two 50 H.P. Standards.

HENRY H. JENNINGS HERMAN JAGLE

H. H. JENNINGS COMPANY

FORMERLY KNOWN AS

JENNINGS YACHT BROKERAGE COMPANY

AMERICAN AND FOREIGN YACHTS

Merchant Vessels for Sale and Charter

HAMBURG-AMERICAN BUILDING

Telephone Rector 8545

Cable Address Yachtbroco, Newyork

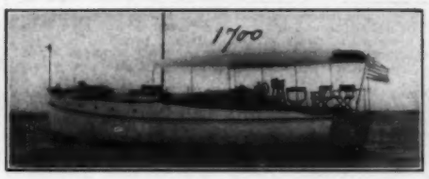
45 Broadway New York City

Surveying Marine Insurance

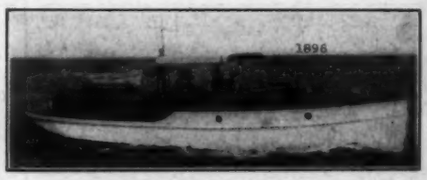
Our list comprises all the available yachts for sale and charter. Below are a few of our offerings. If none of these appeal to you, write us your requirements. Our knowledge of the yachts we offer, and our 25 years' experience in the business, insure satisfaction to any one buying or chartering a yacht through this office.

SEND FOR OUR CATALOGUE

1895. 50 ft. cruiser. Double staterooms, saloon, etc. speed 10 miles.

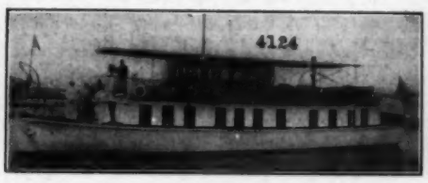


1700. 48 ft. cruiser. Double staterooms and saloon; sleep six. Speed 10 miles.



1896. 50 ft. twin screw cruiser. Double staterooms, two saloons, etc. Speed 10 miles.

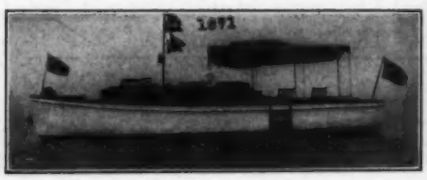
4264. 50 ft. auxiliary yawl. Two staterooms, two berths in saloon. Speed 6 miles.



4124. 70 ft. twin screw houseboat. Three double staterooms, main saloon, social hall, bath, etc. Speed 10-11 miles.

3947. 65 ft. auxiliary schooner. Stateroom and saloon sleep five.

4241. 60 ft. auxiliary yawl. Two staterooms, two berths in saloon. Speed 9-10 miles. Bargain for quick sale.

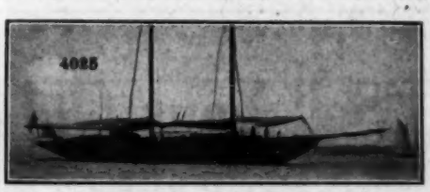


1871. 32 ft. cruiser. Two berths in cabin; toilet; 15 H.P. motor. Speed 9 miles.

1910. 50 ft. cruiser. Stateroom, main cabin, toilet and crew's quarters. Speed 10 miles.

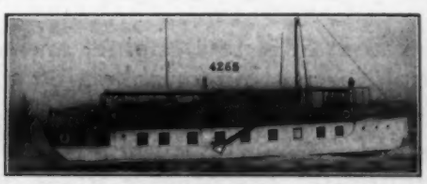
1488. 50 ft. cruiser. Stateroom and saloon sleep six. Speed 14 miles.

3260. 55 ft. auxiliary yawl. Stateroom and saloon sleep five. Speed 8½ miles.



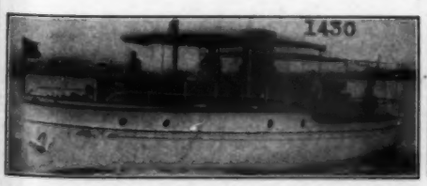
4025—106 foot auxiliary schooner, 5 ft. 6 in. draft. Four staterooms, large saloon, two bathrooms, etc. Speed 9 knots under power.

1899. Sale or charter—65 ft. express cruiser. Two staterooms, saloon, bath, etc. Speed 18 miles.

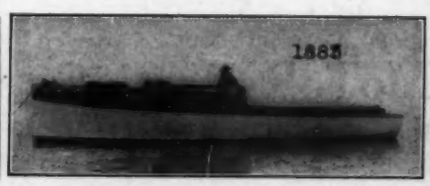


4265. Charter 75 ft. twin screw houseboat. Four large staterooms, dining saloon, bath, etc.

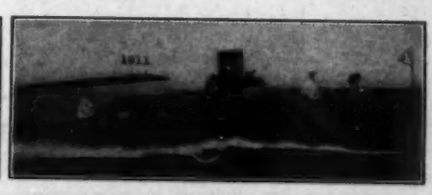
1373. 90 ft. twin screw power yacht. Three staterooms, main cabin, dining saloon, two bathrooms, etc. Speed 13-14 miles.



1430. 60 ft. twin screw cruiser. Two double staterooms, saloon, two toilets, etc. Speed 12 miles.



1883. 36 ft. cruiser. Two berths in cabin; toilet, galley, etc. Speed 10-12 miles. Price attractive.



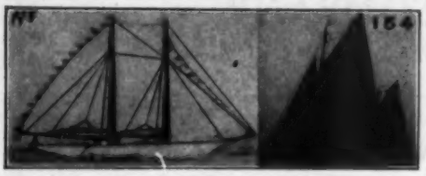
1911. 45 ft. Express Cruiser. Speed 27 miles.

THE MOTOR BOATING MARKET PLACE

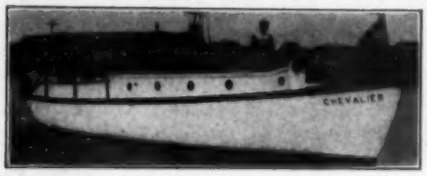
The rate for "For Sale" and "Want" advertisements is 3 cents per word, minimum 75 cents. If an illustration is used, the charge is as follows, which includes the making of the cut:
Cut one inch deep, one column wide..... $3
Cut 1½ inches deep, 1½ columns wide..... $5
Cut three inches deep, three columns wide..... $15

Opportunities for the Motor Boatman

Before you buy or before you sell examine the exceptional buying and selling opportunities under the heading. They comprise the best offer of the month. Please mention MOTOR BOATING.



198—76 ft. Auxiliary Schooner, 35 tons, 80 h.p. 4 cyl. 4 cyc. 9 x 11 in. Lead ballast, $17,000. N. Y.
154—35 ft. Lawley Auxiliary Yawl, Union silk sail, mahogany cabin, $900. Ontario. Free illustrated Boating List. New and second-hand engines. Client wants light draft schooner or yawl. Owners send for listing blank. Canadian Boat & Engine Exchange, Toronto.



Cabin Cruiser "Chevalier." Fine seaboat. Lines by R. M. Haddock. 38 ft. 10 in. x 9 ft. x 30 in. draft. 6 in x 12 in. oak keel. 2 in. x 2 in. oak frames. 1¼ in. cedar planking. Copper riveted. Mahogany trim. Forward deck 8 ft, afterdeck 6 ft., cabin 14 ft. (sleeps four), cockpit 11 ft. A. P. B. A. rating 46.80. Speed 9 miles. 4 cyl. engine, 24 h.p. silent exhaust. 70 gal. water tank. Two 65 gal. gas tanks. L. H. Parke, Bay Head, N. J.

Submarined prices on engines one to one hundred H.P. for boats, ice sleds, hydroplanes, aeroplanes, autos, trucks, tractors, mills, elevators, factories, farms, bought, sold, exchanged. Largest dealers in engines for every purpose and supplies for same. Four cyl. 4 cycle 6 x 8 Standard in first class condition $485; and hundreds of others. State your power needs. We have what you want at price you want to pay. Badger Motor Company, Milwaukee, Wis.

CANADIAN RUNABOUT—Genuine 30 miler, 28' x 5' 4" Crouch V-bottom runabout, cedar planking, mahogany decks, nickel deck fittings, electric running lights, Sterling 45-65 six-cylinder, Bosch magneto, rear starter, Francke coupling, $1350. Owner building cruiser.
Canadian Beaver Co., 135 Lake St., Toronto, Ont.

FOR SALE—Attractive opportunity to purchase 4-cylinder 8 x 10, 65-75 H.P. Standard Marine Engine. Purchased new from builder Spring, 1917, run about 500 miles. Will sell for little over half price. For particulars apply J. B. Cousins, 373 De Kalb Ave., Brooklyn, N. Y.

FOR SALE—32 ft. V-bottom cruiser, 8 ft. 10 in. beam, 3 ft. draft. Speed 10 m.p.h. actual. Complete equipment including toilet, cushions, sink, icebox, stove, 10 ft. tender. 20 H.P. Regal engine, 4-cylinder, 4-cycle, 4½ x 5½, Bosch magneto, mechanical oiler, reverse gear. Everything new this year and used part of season only. Apply to George Kloetzer, 377 Potter Ave., Long Island City, New York

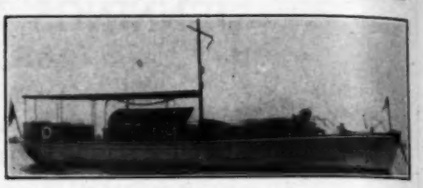
GUARANTEED REBUILT ENGINES.
The following engines are overhauled in our own shop and guaranteed to be in good running order with equipment listed. These are engines we have taken in trade on new engines and can be bought at the following low prices which we allow for them in trade.
Murray & Tregurtha:—40 h.p. 4-cyl. 6 x 6. Complete with reverse gear, Bosch and Delco ignition. Price $550.00.
Buffalo:—15 h.p. 4-cyl. Complete with Reverse Gear and new Atwater-Kent ignition, $250.00.
Gray:—6 h.p. single cyl. Complete with ignition outfit, $60.00.
Van Blerck:—8-cyl. 115 h.p. with complete equipment including electric starting and lighting outfit. Practically new, used only one season, $220.00.
Palmer:—5 h.p. 2-cyl. Complete with Paragon Reverse Gear. This is a new engine, never having been in a boat, $100.00.
Send for complete list of over thirty engines. An especially good chance to buy a guaranteed second-hand engine at from one-half to one-third cost of a new one.
WALTER H. MORETON
214 State St. Boston, Mass.

IN FLORIDA—For Sale or Charter—One 40 and 50 foot cruiser, double deck, special light-draft for Florida waters. Geo. H. Dorr, 506 Evernia St., West Palm Beach, Florida.

WANTED—125 to 150 life preservers, 100 camp chairs with backs, two 50 to 60-lbs kedge anchors, 8-inch bell, cushions, whistle and tank, plain linoleum. Geo. H. Dorr, 506 Evernia St., West Palm Beach, Florida.

14 H.P. Model T Gray engine; 2 coils, carburetor, high tension Bosch magneto; rear starter, bronze paddle wheel; engine used two seasons; in first class condition. Have also reverse gear, but it needs fixing. Price complete, $165. R. Bennett, Raquette Lake, N. Y.

Captain and Pilot—Maine to Key West, Cuba, Nassau, Bahamas, Gulf of Mexico ports. Sail, auxiliaries and power yachts delivered anywhere. Unquestionable credentials. Reasonable. Prompt deliveries. Licensed. Winter address, Elser's Pier, Miami, Fla. Summer, MoToR BoatinG, 119 W. 40th St., New York City. Capt. E. B. Jennison.



FOR SALE or Exchange for larger yacht. 53 ft. x 12 ft. x 3 ft. Exceptionally fine cruiser in perfect condition. Twin Screw. Ideal yacht for Southern waters. Harry W. Sanford, 501 Fifth Ave., New York City.

USE "SNAPPER" ENGINES for your small boat. They are a big little engine built by The Automatic Machine Co., Bridgeport, Conn.

FOR SALE—The well-known Apache II Motor Boat, 40 ft. long, 10 ft. beam, 3 ft. 6 in. draft, trunk cabin, 13 ft. aft deck, Lamb 30 H.P. engine, new last year. Speed 12 miles and better; room for six to sleep, Pullman berths and 6 ft. 3 in. head room in cabin all parts. Boat has been thoroughly overhauled last spring, and is in the best of condition, and all copper fastenings and fully equipped. Can be seen at the Beech Hurst Yacht Club, White Stone Landing, Long Island, by arranging with owner Nicholas T. Brown, 1275 First Ave., New York City.

CANADIANS, Second-hand engine bargains. Send for list.
GUARANTEE MOTOR COMPANY
73 Bay Street, North Hamilton, Ont., Canada

FOR SALE—Cruiser Model-sie: High grade 36 feet x 8 feet 6 in. x 3 feet cabin cruiser built by the Seabury Co. and in fine condition. 4 cylinder, 4 cycle Speedway engine. Speed 10 miles. Exceptionally fine finished interior, perfect equipment. Cost $5000 00. Will sell reasonable. E. P. Eaton, Sag Harbor, N. Y.

FOR SALE—One 64' 6" x 11' 3" x 4' 7" steel hull with two 26-30 H P. Buffalo Heavy Duty engines. Engines completely rebuilt by factory. Will sell engines and hull together or separately. Evansville Railways Company, Evansville, Ind.

WANTED—25 to 30 ft. Hull capable of making 30 miles or more with engine developing 100 H.P. at 1600 revolutions. Give full particulars relative to condition and price. Rich Tool Co., Railway Exchange, Chicago, Ill.

Boat 61 ft. long, 11 ft. Beam, 4 ft. draft. Speed 13 miles. 6-cylinder 60 H.P. Campbell Motor. Motor run only 4 months. Hull in A-1 shape. A bargain for cash. North Star Boat Line, Ortonville, Minn.

FOR SALE—Eight-cylinder Sterling, 5½ x 6 electric self-starter, Schebler Carburetors, condition excellent. Demonstration given in boat. D. B. Roberts, 51 Elm Street, Hartford, Conn.

BARGAIN FOR CASH—Raised deck cruiser, 38 feet, 20 H.P. Twentieth Century engine, complete cruising inventory, sleeps six. $1,200. Landy, 50 Church St., N. Y.

Sell Your Old Engine in the Market Place

MoToR BoatinG's Market Place columns offer the buyer and seller of used motor boats, fittings, etc., a quick and convenient medium of exchange.

If you are getting a new boat or a new engine, and wish to sell the old one, don't have it rotting, or rusting, or collecting storage charges—sell it—in the **Market Place.**

Perhaps you have waterfront property suitable for a yacht club, or for individual yachting enthusiasts—the **Market Place** goes to over 25,000 individuals interested in all things pertaining to the water.

Try this **Market**—it is resultful.

MoToR BoatinG

119 WEST 40th STREET **NEW YORK CITY**

THE MoToR BOATinG MARKET PLACE

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Cut one inch deep, one column wide..... $2
Cut 1¼ inches deep, 1¼ columns wide..... $5
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Opportunities for the Motor Boatman

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The increasing demands of Government work have made it necessary to employ all our extended facilities for this service.

Several Company owned boats are offered for sale at prices which are but small fractions of their original cost. A request to the Brokerage Department will bring complete data.

75 foot Cruiser	12 miles
56 foot Day Cruiser	16 miles
50 foot Day Cruiser	23 miles
45 foot Open Boat	20 miles
40 foot Open Boat	18 miles
40 foot Runabout	29 miles
25 foot Yacht Tender	10 miles
25 foot Yacht Tender	14 miles
25 foot Yacht Tender	13 miles.

GAS ENGINE & POWER COMPANY AND
CHARLES L. SEABURY & COMPANY
CONSOLIDATED

Morris Heights — New York City

New York Show Number of MoToR BoatinG

REGULAR FEBRUARY ISSUE

Advertising forms close January 10th to 15th

Covering the New York Motor Boat Show which is held in the Grand Central Palace, New York, from January 19th to 26th.

SALES AND ADVERTISING MANAGER WANTED —By the manufacturers of a well-known line of marine, stationary and aeronautic motors, located on the Great Lakes. State business experience. Box "12," care of MoToR BoatinG.

A few medium and high speed four and six cylinder, four cycle motors, new or rebuilt. Reliance Motor Boat Co., 207th St., Harlem River West, N. Y. City.

Mobile, Ala., is an ideal location for building of power boats. Midway of the Gulf Coast, cheap timber, near the Birmingham steel mills. Big demand for power boats all along the Gulf, Cuba, West Indies and Central America. Direct steamers to said countries. Mobile Light and Railroad Co.

For new and second hand marine engines write American Motor Manufacturing Co., Stillwater, Minn., manufacturers of the celebrated Campbell marine engines.

OIL ENGINES, direct reversing on fuel. Better than Bolinder's. Proven in service. Standardized. Designer wishes to make arrangements for working U. S. patents recently issued. Address Designer, 28 Airedale Avenue, Chiswick, London, W. 4., England.

DON'T SCRAP YOUR ENGINES ON ACCOUNT OF SCORED CYLINDERS OR POROUS HOLES.
We repair them by our Patented Process—fusing a silver and nickel alloy electrically without warping or enlarging the bore. Write to our nearest plant. L. Lawrence & Co., New York, 546 W. 45th St.; Detroit, 1246 E. Jefferson; Chicago, 1522 Michigan Ave.; Newark, N. J., 292 Halsey St.

Trimount Whistle Blower Outfits
Blower runs by friction contact with engine flywheel. Whistle of brass, nickel-plated.
Made in 3 sizes.

Trimount Rotary Hand Bilge Pumps
All bronze composition. Suction lift 6 to 20 feet. A lifelong convenience.
Made in 3 sizes.

TRIMOUNT ROTARY POWER CO.
20 Heath Street — Boston, Mass.
(Factory: Whiting Ave., East Dedham, Mass.)

NAVAL ARCHITECTS & YACHT BROKERS

JOHN G. ALDEN
Yacht Broker and Naval Architect
148 STATE STREET, BOSTON, MASS.
Rooms 814-815 : : Telephone, Richmond 2832

Thomas D. Bowes, M. E.
NAVAL ARCHITECT AND ENGINEER
Offices:
Lafayette Bldg., Chestnut and Fifth Sts.
PHILADELPHIA, PA.

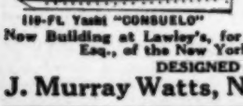
COX & STEVENS
Engineers and Naval Architects
Yacht Brokers
15 WILLIAM STREET, NEW YORK CITY
TELEPHONE 1375 BROAD

William H. Hand, Jr.
NAVAL ARCHITECT
NEW BEDFORD, MASS.
HAND-V-BOTTOM DESIGNS
Write for 48-page illustrated catalog

FREDERICK K. LORD
NAVAL ARCHITECT
120 BROADWAY NEW YORK

FREDERICK S. NOCK
Naval Architect and Yacht Builder
Marine Railways, Storage, Repairs
EAST GREENWICH RHODE ISLAND

HARRY W. SANFORD
YACHT BROKER
501 FIFTH AVE., at 42nd ST., N. Y.
(Astor Trust Building)
Desirable yachts of all types for sale and charter
Telephone 960 Vanderbilt


110-Ft. Yacht "CONSUELO"
Now Building at Lawley's, for J. PERCY BARTRAM, Esq., of the New York Yacht Club.
DESIGNED BY
J. Murray Watts, N. A. 328 Chestnut St Philadelphia
Sixteen Years Designing Experience
Specialty
Seagoing Yachts

BRUNS, KIMBALL & CO., Inc.
115 Liberty Street New York City
Offer over 200 re-built engines, backed by a strict guarantee, at especially attractive prices. List will be sent free for the asking. Your present engine will be taken in part payment for a new Sterling, Kermath, Hartford, Missouri, Universal, and Aristocrat, 4 cycle; Eagle, Hartford, Cady & Arrow, 3 cycle; Missouri heavy oil engines, simple and economical. Write for offer.

Buy Battleship Bunting
BETSY ROSS FLAG CO.
FAMOUS FOR FLAGS
NEWBURGH, N. Y.

Ten Years of MoToR BoatinG

(*Continued from page 52*)

nautical miles in 13 hours, 10 seconds. The Gold Cup Race on Lake George was won by Baby Speed Demon II, which also won the one-mile championship at the rate of 51.726 statute m.p.h. The Cape Cod Canal was opened to small boats this season, five years after the construction was started.

In 1915, Flyaway III won the New York to Albany and Return Race of the New York Motor Boat Club, making the 270-mile run in 12 hours, 34 seconds. In the Block Island Race this same boat lowered the time record to 5 hours, 4 minutes, 20 seconds, but was beaten by Cero on time allowance. This race had two other notable contestants, the express cruiser Romany and the scout cruiser Hoop-La, both fast boats. The Gold Cup Race was held on Manhasset Bay and was won by Miss Detroit, taking the cup back to fresh water again. The one-mile championship race was won by Tech, Jr., making a new record of 53.7 miles per hour. This speed record was again lowered, this time at Chicago by the 40-foot Disturber IV, driven by two engines aggregating nearly 2000 h.p., and making a record of 54.9 m.p.h. for a 15 mile lap and 61.5 m.p.h. for a half-mile dash.

The Block Island Race of 1916 was won by Counteas, establishing a new low record of 4 hours, 12 minutes, showing a speed of 27.6 m.p.h., which was the best yet made by an express cruiser in competition. The Gold Cup Race at Detroit was won by Miss Minneapolis, making the record of 50 m.p.h. on a 30 nautical mile course, and also the one-mile championship at 61.038 m.p.h.

The 1917 Gold Cup Race held at Minneapolis was won by Miss Detroit II. The same boat, driven by its 250 h.p. engine, won the one-mile champion contest and established a new record of 61.724 statute m.p.h., nearly a quarter mile per hour better than made by Disturber IV. with its 2,000 h.p. engines two years before at Chicago.

As this issue marks the completion of our tenth lap in the never-ending race for supremacy in the motor boat world, and as we now are in the lead, it may not be out of place to say just a word about ourselves and compare the magazine of ten years ago with that of to-day.

The growth of MoToR BoatinG has been as rapid as the development of the motor boat, and we can now claim the largest circulation of any magazine treating on the subject of motor boats for pleasure, sport or business. A comparison of the first issue of MoToR BoatinG with the present number is interesting and well illustrates the progress made during the last ten years. The first number was nine by twelve inches in size and made up of forty-four pages, including the cover. Of these, seven were devoted to the designs and descriptions of new motor boats, two pages to marine motors, three pages to accessories, sixteen pages including three full pages of illustrations to several articles relating the pleasures of motor boating, the marked increase in the number of motor boats, suggestions for laying up the boat and engine for the winter and such subjects of interest to the motor boatman, and a table of contents. The remaining fifteen pages were taken up by advertisements. The most noticeable change is probably the great increase in the number of illustrations, especially those of new boats.

The early issues contained no such help to the man about to purchase a boat or motor as he can now secure through the list of boats of standard design or the directory of American marine motors as published in the Buyers' Reference and Export Number every December. There was no opportunity presented at that time for the exchange of ideas and methods as is now conducted in the Prize Contest Department.

From the very first the magazine has devoted considerable space to articles on piloting, navigation as applied to motor boats and like subjects of such vital importance to motor boat owners.

Seventy Miles an Hour in a Motor Boat

(*Continued from page 53*)

of the engineer's ability to produce a power plant which possessed the necessary amount of perfection and upstanding qualities which is necessary for this kind of service. Earlier in the season a few minor details had not been perfected which interfered with the workings of the entire outfit. Consequently when the boat was put to the test she failed.

Great was the disappointment to the owners and followers of the sport of hyproplane racing when the motor failed to make good earlier in the season. But this great disappointment was turned into gratification as the earlier trouble was analyzed and found to be a slight imperfection in the quality of the metal used for the valves. Engineers were set to work developing a metal which would meet the requirements with the result that an entirely new metal was discovered and developed which may mean revolutionizing present practice.

Whip-po'Will, Jr., owned by Commodore Albert L. Judson, is the 25-footer which was built to make an effort to bring the Gold Cup back to Lake George. The design and construction of the hull is the work of Jack Beebe, well known in hydroplane racing circles. The motor, which is reported to deliver in the neighborhood of 500 h.p., is fundamentally a twelve-cylinder Van Blerck. The times and speeds made by Whip-po'Will, Jr. in her recent runs which establish a new World's Record follow:

RUNS OF WHIP-PO'WILL, JR., LAKE GEORGE, COURSE 1 STATUTE MILE

November 4, 1917

Run No.	Time Secs.	Speed M.P.H.
1	55.07	65.37
2	56.27	63.98
3	55.00	65.45
4	56.00	64.29
5	55.07	65.37
6	56.27	63.98

Average speed, 64.74 miles per hour.
Timers: H. Sampson, Jr., W. G. Watts, C. F. Chapman.

November 6, 1917

Run No.	Time Secs.	Speed M.P.H.
1	53.00	67.92
2	51.67	69.67
3	51.70	69.63
4	51.35	70.15
5	52.30	68.83
6	51.35	70.15

Average speed, 69.39 miles per hour.
Timers: H. W. Sisson, J. W. Ward, A. D. Roberts, H. C. Knoblauch.

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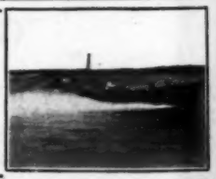

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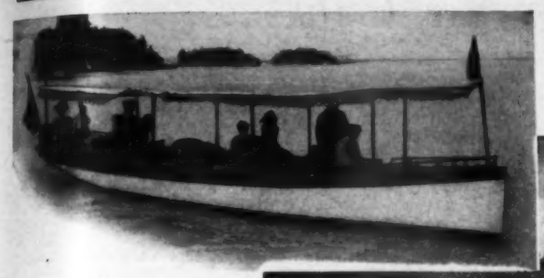

Elco-built electric launch of 1893

The 36-ft. Elco Express

Evolution

The evolution of the motor boat from its earliest type to the beautiful express models of today has been assisted in no small degree by the efforts of the Elco Company. Above is shown an electric launch built by this company in 1893 together with its direct descendant, the latest 36-foot ELCO EXPRESS, which is guaranteed for 26 miles an hour, equipped with a 100 H.P., 6 cylinder engine, self starter and electric light plant.

Standardization

Since the first, the consistent effort of the Elco organization has been in standardizing its product after developing each type to the highest point of perfection. Only by standardization have Elco achievements been made possible.

Here the building of fine boats is a business of mammoth proportions, planned along the most efficient lines and carried out under the most favorable manufacturing conditions. Here have come the naval authorities of the world's greatest governments with orders and repeat orders for large motor launches and submarine chasers.

Production

The story of Elco production is best told by a brief statement of a few quantity orders executed in the past and some now in construction.

1893— 55 Electric Launches, all of one design, built and operated at the World's Fair, Chicago.
1904—120 Mine Planters, all of one design, built for the U. S. War Department.
1905— 4 Steam Cutters, all of one design, built for the U. S. War Department.
1908— 32 Mine Planters, all of one design, built for the U. S. War Department.
1905 } 94 Self-riding, self-bailing, power Life Boats, built for the U. S. Life Saving Service.
1916 }
1915—550 80-foot Submarine Chasers, built for the British Admiralty and delivered 15 days ahead of contract time.
1917— 90 80-foot Submarine Chasers for the Italian Government.
1917— 16 110-foot Submarine Chasers for the U. S. Government.
1917— 30 80-foot Submarine Chasers for the British Admiralty.

The ELCO COMPANY, MAIN OFFICE AND WORKS 201 AVENUE A **Bayonne, N. J.**

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New York Office: 13 Pine Street

One of the 550 eighty-foot Submarine Chasers built for the British Admiralty. 30 more are now being completed for them.

From Hydroplane to Air Cruiser

(Continued from page 15)

the flights of January 26 we find the inventor flying the machine which was to be adopted by the United States and foreign Navies. Three weeks after, on February 17, 1911, he introduced the new craft to the United States Navy by flying to and landing alongside of the cruiser Pennsylvania, was hoisted aboard by the ship's crew, and when dropped overboard again rose and flew back to shore. Thereafter a number of the aviators used Curtiss hydroaeroplanes for exhibition work, and the navy having purchased a Curtiss hydroaeroplane, naval officers—Lieuts. T. G. Ellyson and J. H. Towers—learned to fly, won their certificates with it, and made scores of flights. During October 17-21 Hugh Robinson flew from Minneapolis to Rock Island, Illinois, 370 miles, carrying and distributing mail along the route. Hundreds of flights had been made by the close of 1911 with one and two-passenger types, fitted with motors of 60 h.p. and 75 h.p., and a speed of 50 miles per hour on the water and 60 miles per hour in the air had been attained.

A further development, a machine with a float of pronounced boat shape, was made in the fall, 1911, and was tried on January 10, 1912. The fundamental idea was changed from that of a floating aeroplane to that of a flying boat. The first trial was successful, the craft fitted with a 60 h.p. motor rising from the water with ease, and traveling on the water at a speed close to fifty miles an hour and in the air at one mile a minute.

The first test of seaplanes in a competition took place at Monaco on March 24-31, 1912. It was organized by the International Sporting Club of Monaco, which offered 15,000 francs for prizes to be divided between the three winners; first, 8,000 francs; second, 4,000 francs; third 3,000 francs. The contest was for starting and alighting and landing from dry land, and passenger carrying. Points were awarded to the winners of daily contests, and the one getting most points won the prize.

This contest, being the first of its kind and coming at a period when the navies were looking for aircrafts for marine service, was well attended by sportsmen and military authorities of different countries. Ideal weather favored the meet from beginning to close, enabling most of the aviators to contest daily.

Seven aviators flying five different types of machines took part and concluded as follows:

Aviator	Machine	Motor	Points
Fischer	Henri Farman biplane	Gnome	112.10
Renaux	Maurice Farman biplane	Renault	100.80
Paulhan	Curtiss biplane	Curtiss	86.30
Robinson	Curtiss biplane	Curtiss	71.90
Caudron	Caudron biplane	Anzani	63.
Benoit	Sanchez Besa biplane	Salmson Unne	41.75

The meet was a success, but the craft had its disadvantages, principally that of precluding the test on rough water. It would have been interesting to ascertain whether such large machines as the Henri Farman and Maurice Farman, whose large spread made it possible to rise from the water with as many as five passengers, could withstand the heavy sea as well as the Curtiss Triad, which was quite at home midst four feet breakers, and was the fastest machine in the contest. The importance of this meet was that it brought forth the importance of testing seaplanes in rough water.

By August, 1913, marine flying had become quite popular. In the United States a number of sportsmen, including Robert J. Collier and Harold F. McCormick, owned their own seaplanes, and the United States Navy conducted important experiments, particularly the launching of seaplanes from ships, the details of which are given in another chapter. This country led in efficiency of types of seaplanes, and different foreign governments purchased our flying boats. It must be stated that much of the progress was due to the able efforts of Henry A. Wise Wood, who fathered "marine flying" from the very beginning when the hydroaeroplane was considered a freak. He encouraged experiments in marine flying and prophesied exactly what has come to pass. Much credit is also due to Captain W. I. Chambers, U. S. N., for his able work in 1911-1913.

France was also progressing rapidly. The list of seaplanes which competed in the Paris-Deauville race and the Deauville meet held in August, 1913, gives the status at marine flying in France at the time.

The Paris-Deauville Race

The race from Paris to Deauville was held on August 24, ten machines, each carrying a pilot and passenger, taking part. The pilots starting were: Weymann, Levasseur, Prevost, Janoir, Molla, Chemet, Rugere, De Montalent, and Divetain.

The distance from Paris to Deauville, following the Seine, is 330 kilometers. Chemet covered the distance without a stop in 3 hours, 47 minutes, 51 1/5 seconds. Three others stopped en-route and finished as follows: Molla, 8 hours, 46 minutes, 11 1/5 seconds; Janoir, 10 hours, 11 minutes, 4 seconds. Levasseur was disqualified, however, for not passing the control at Mousseaux.

Of the other contestants Weymann, who flew very low and actually flew at full speed under bridges, was stopped by trees. In trying to take a short cut over a narrow branch of the river at Saint-Pierre-du-Vouvray, Divetain had to quit at Elbeuf, his floats having been damaged in landing on a rough shore. De Montalent fell near Rouen, his heavy machine being caught in remous at a low altitude.

The results of this race were not up to the standard established by French aviators—who in the year past had made many flights of between 500 and 1,000 miles a day. A 500-mile flight was no longer recorded by the press, and an 800-mile flight, of which half a dozen had been made in the past months, was given but a few lines. The reason for this was that the contestants had to follow the Seine, which is tortuous and often narrow and lined with trees; and to pass each control, of which there was one at every bend of the river, they found it necessary to fly low, and thereby go through the remous. This was the cause of the Montalent disaster, and the reason for the victory of the light machines.

The Deauville meeting, like the Paris-Deauville race, was attended by excellent weather, which favored in many ways the light-built, low-powered machines, except during part of two days, the twenty-ninth and thirty-first, when the sea was heavy, once with a gale, then so rough that the destroyers, which had been on the scene of operation each day, remained in the harbor until the wind had abated.

Tremendous Development in 1914-1915

The developments since 1914 have been tremendous. The development of greatest basic importance leading to the air cruiser was the development of the multiple-motored seaplane. The first twin-motored flying boat was the Wanamaker flyer, America, ordered from the Curtiss Aeroplane Company by Rodman Wanamaker in the early part of 1914, for the purpose of making a trans-Atlantic flight. The America was a flying boat, the hull of white cedar, 32 feet long and with a beam of 4 feet. The upper wings had a 72-foot span and the lower 46. It was equipped with two 100 h. p. Curtis motors. It was figured out that the machine could lift easily the 5,000 pounds of weight which would include: fuel, 2,000 pounds, made up of 300 gallons of gasoline and 25 gallons of oil; hull, 550; pilot and assistant, 300; motors, wings, tanks and supplies, 2,150. The two oil tanks were suspended above the engines; the gasoline tanks, five in number, were arranged in the hull, and the gasoline was forced up from the tanks to the motors above the operators' heads.

The America was christened on June 23, on Lake Keuka, N. Y. As the final tests were being made war was declared and Lieutenant John C. Porte, of the British Royal Naval Flying Corps, who was to pilot it, had to return to England for service. The America was acquired by the British Admiralty and was used for many months for patrol duty, and then as a training aeroplane.

An important contribution, making it possible to stow seaplanes on board of a ship in the minimum space, was the development by the Short Brothers, the British aircraft manufacturers of the folding wings seaplane.

Another valuable development was the Gallaudet seaplane with a new stream line system of propulsion. The connection between the front and rear portions of the body and the mounting of the propeller of the Gallaudet seaplane is so rigid and strong that the chances of propeller failure are reduced to a minimum. The part of the propeller nearest the center, which absorbs power without producing any propulsive effect, is inside the body, so that the power usually lost in this portion is expanded with the heat near the tips. The result is estimated to be an increased propulsive efficiency of ten to twenty per cent., according to the relative diameters of body and propeller.

In 1916-17 the number of twin-motored seaplanes increased, and there were also built larger seaplanes equipped with three and four motors. One of the Curtiss seaplanes equipped with three motors is shown on page 13. The larger air cruiser, also built by the Curtiss Aeroplane Company, when sent to England, was equipped with 4,250 h. p. motors, and during the tests carried 3,500 pounds of crew and equipment. This type of air cruiser opens new problems, requiring mechanical piloting, and special arrangements for housing it. The first problem can be solved by the employment of the Sperry gyroscope pilot; the second would probably be solved by making the hull more substantial so that the machine can be kept in the water all the time. Once these two problems have been solved, larger air cruisers will be built.

There is no visible limitation as to the size which air cruisers can be built, and as the weight and fuel consumption of motors decreases the capacity for carrying useful load increases, permitting the building of stronger hulls to withstand the roughest conditions. In discussing the subject of torpedoplanes with the writer, Glenn H. Curtiss stated that he was ready to construct a large torpedoplane capable of carrying a half-dozen torpedoes and landing at sea and riding the sea for days. This would make it possible for an air cruiser while on patrol duty to fly out 500 miles and remain at sea on the lookout for hostile ships, only rising occasionally to scan the sea for enemy ships, saving its fuel which would eliminate the expenditure of fuel involved in returning to the base each night.

Double Crew Air Cruiser Next Development of Importance

The air cruisers of to-day are still single crew vessels. The next development of importance will be the double crew vessel—and that is the development which is going to start the area of aerial transportation across the Atlantic and over great distances. This will probably happen in the ensuing year, and when it does come, aeronautics will reach what Herbert Spencer would call a "pivotal point" which changes the aspect and purpose of a thing. Aircraft will cease to be essentially an instrument of war and will become a vehicle of transportation—and we can expect that the aeronautic industry will develop in the coming five years on an even more extensive scale than the automobile industry has developed in the last ten years.

Pioneers of the Motor Boat and Engine Industry

(Continued from page 80)

THE Great Lakes Boat Building Corporation is probably the oldest surviving pioneer of all the companies originating in the Mississippi Valley and Great Lakes section. The beginning really dates back to 1895 under the name of the Medart Knock Down Boat Company, of St. Louis, which, so far as the records show, was the originator of the knock-down boat. Operations were conducted at St. Louis until 1904, when Mr. C. F. Sparks became interested in the company and changed the name to the Sparks Boat & Engine Company, and removed the plant to Alton, Illinois. Under Mr. Sparks' supervision the business of the company was expanded very largely. The finest and fastest boats on the Mississippi River and the Great Lakes were built in the Alton shops. Among these were included the "Sparks 1st," "Sparks 2nd," "Santa Claus," and "Sumac."

In 1914 the Sparks Boat & Engine Company was taken over by Mr. W. C. Morehead and his associates, and the name changed to the Saint Louis Yacht & Boat Company, with shops and yards at Alton, Illinois, and general offices in Saint Louis. The operating organization of the old company was not disturbed in any way whatsoever, but new blood was added and the manufacturing facilities materially increased. Among some of the well-known boats which were turned out under the name of the new company were Petrol, owned by Mr. Alfred I. Du Pont, and now seeing service in the Patrol Squadron Fleet; the Nueses for the United States Government at Galveston; and the racer Mark Twain.

The business of the Saint Louis Yacht & Boat Company grew so rapidly that the management decided to obtain a new site with facilities for building larger boats than could be handled in the Alton plant. After canvassing the market at length, the property of the Milwaukee Yacht & Boat Company at Milwaukee, Wisconsin, was purchased outright, and the largest and best equipped yards of their kind made available, to the organization of the Saint Louis Yacht & Boat Company. After removing to Milwaukee the name of the company was changed to the Great Lakes Boat Building Corporation, under which corporate title the business is now conducted.

The management of the Great Lakes property is still supervised by the President, Mr. W. C. Morehead. The organization contains many of the men identified with the old Medart and Sparks Companies back in the late 90's and the early years of 1900. One of these men is Mr. Walter D. Beauvais, the designer, who is largely responsible for the development of the V-bottom design.

Mr. Beauvais built his first V-bottom runabout, the 26-footer Wild Cat in 1909 for Mr. Hugo Lippard, of St. Louis. This boat, powered with an 8-cylinder V-type 5 by 5 Missouri engine, developed a speed of 30.5 miles per hour. In 1910 and 1911 many other boats of V-bottom design were turned out, all of which proved to be successful models. In fact, the development went so far as to clearly demonstrate the advantages of the V-bottom design and it attracted much attention from the builders all over the country. During Mr. Beauvais' nineteen years of service with the Great Lakes Boat Building Company and its predecessors he has been responsible for the development of the V-bottom boat from the 26-footer Wild Cat to the palatial 76-foot high speed express cruiser Kumagin, which was launched just this summer, and which up to the present time is the largest V-bottom cruiser afloat.

The Great Lakes Boat Building Corporation claims for itself the credit of building the largest number of high speed express cruisers under 75 feet in length of any company in the country. Among its designs is the Military Type Express Cruiser, which has created for itself a national reputation.

Frisbie Motor Company

THE business of this company had a very modest beginning, in fact, before the incorporation of the Frisbie Motor Company, our present President, Russel A. Frisbie, manufactured single handed or with one or two men a few motors for his own pleasure in an old barn up in Cromwell, three miles from here, an old New England City, about 260 years old. The first automobile in this county was built by Mr. Frisbie, and some of the very earliest boats on the river here were equipped with his own engines.

The business gave some promise of increasing, so the plant was moved to Middletown, across from the present Yacht Club. The new home of the company was established about 1907, at which time it was incorporated.

Like other shops in the first instance job work, automobile work, etc., was a large part of the business, but the marine motor which was manufactured then in a small way was too good a proposition to be downed and has developed to its present state.

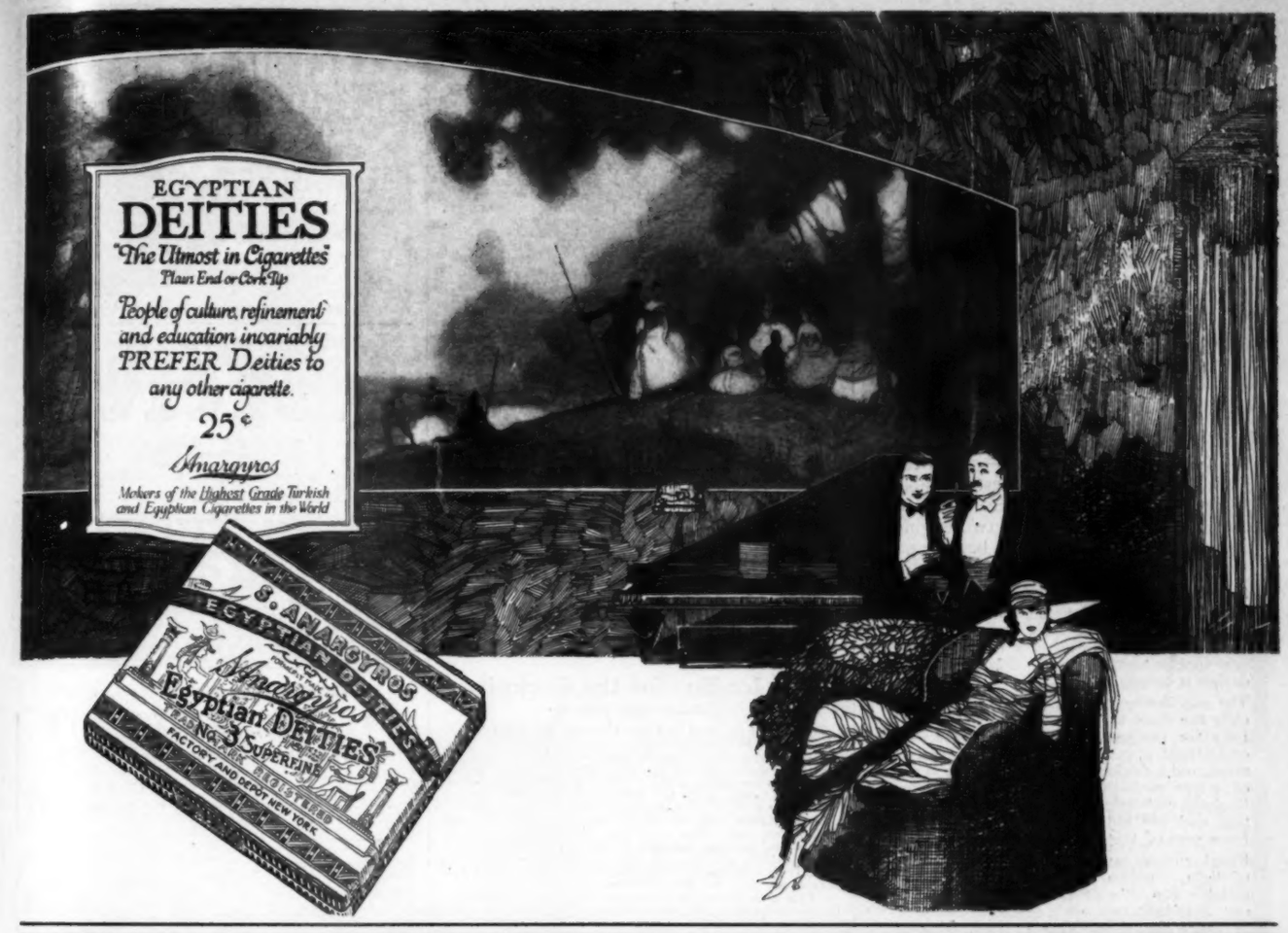
From the incorporation of the Company the valve-in-head design has been consistently pushed. The Frisbie Motor Co. are pioneers of this valve-in-head design and all of their models have been using this type of construction for a long term of years.

In 1909 the Company moved to new quarters, still in Middletown, which is in fact the present location, and at this time a considerable number of automobiles were manufactured in addition to marine engines, these equipped also with Frisbie engines, still valve-in-head with removable cages.

In 1910 Mr. K. W. Dyer purchased a half interest in the concern. Since that date they have been consistently pushing Frisbie valve-in-head motors and have absolutely discontinued, in fact, long ago, their efforts along the automobile line.

In the early days there were some quite prominent speed boats, powered with Frisbies, but the business has leaned toward the commercial, fishing demand, also cruising engines, runabouts, etc.; they have not gone in for high speed engines, excepting in so far as our regular stock motors permitted, and in this particular have nothing going over 40 miles per hour. The features are the steady plugging and consistent performance which brings home the bacon. See, for example, when a three-cylinder motor, the same as won in the New York-Albany race, made the run of 1,600 miles without a skip, to a point 90 miles beyond Cordova, Alaska. The last paragraph of this article we copy herewith:

"Thus we concluded a journey of 1,600 miles in a 33 ft. boat, part of which was in very thick weather, nearly half of which was in the open sea and several days of which were through storms that made even the big boats run for shelter, so that we feel that we have served our apprenticeship as small boat navigators and are entitled to go as deep sea sailors now almost anytime. It was an endurance test, all right, for the boat, the engine, and for ourselves, but we all came through in good shape, though we give most of the credit to the boat and engine. The latter ran the entire distance without missing a stroke, the only time we touched it being once when we had to change a spark plug which had become sooted, and we did this while the motor was running. On the entire run, the engine averaged 2¾ gallons per hour fuel consumption and used a total of only 3½ gallons of lubricating oil on the trip."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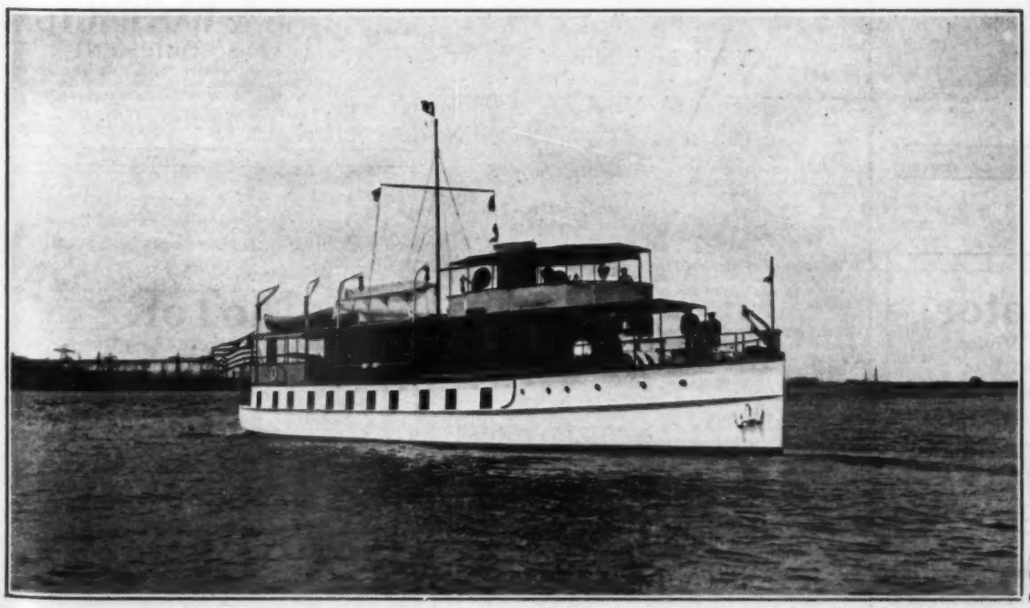
In Florida, Mathis-Built Houseboats

will lead this year, as they have each year since 1909 — when we created the new type Cocopomelo.

The 106 ft. houseboat Leonie, shown below, was built by us for Mr. Murray Guggenheim, New York.

Other recent additions to the Mathis houseboat fleet include the 106 ft. Chieftain, built for Messrs. L. H. and A. W. Armour, Chicago; the 80 ft. Nepenthe, built for Jas. Deering, Chicago, and the 71 ft. Jane VI, built for Mr. A. P. Ordway, New York.



That we are able to serve such men, able to buy the best, is good evidence of our ability to serve you.

Mathis Yacht Building Co.

Cooper's Point
Camden, N. J.

The New 50 H. P. Heavy Duty

REGAL

The new 50 H.P. model is the latest and best example of Regal quality. It is a king among engines—a power plant to use where the best possible heavy duty motor of its size is called for. It is largely used for two-engine installation in twin-screw boats and several of these, Regal equipt, are in government service.

The cylinder dimensions are 7¼ x 9" and the rating of 50 H.P. is easily exceeded. Detachable cylinder heads are used for the first time but otherwise the Standard Regal design is closely followed.

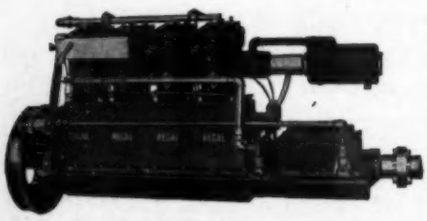
The gasoline-kerosene equipment is practically the same as we have used so successfully for the past four years. There is a centrifugal governor just above the carburetor, and a device for injecting a fine spray of water with the kerosene gas. Bosch-Rushmore electric starting and lighting system, and two independent ignition systems form part of the equipment.

Regal engines are built in different sizes of light, medium and heavy duty models suitable for all motor boats from 14 feet up. Standard four-cycle design is followed in every model—nothing untried, nothing freakish,—but good engineering, good materials and good workmanship throughout. We have been building good engines for seventeen years.

Write today for latest illustrated catalog.

Regal Gasoline Engine Co.

74 West Pearl St. Coldwater, Michigan



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Fans Back to Full Vigor the Faintest Spark of Life

The Draeger Oxygen Apparatus Co.

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WONDER MOTOR

A wonderfully sturdy 4-cycle marine motor. All important parts are interchangeable with parts of the famous FORD automobile motor. Replacements inexpensive and parts in stock everywhere. 22.5 H.P. Atwater Kent ignition.

Price, $245 Write for full details. Also 2-cycle motors.

Elbridge Engine Co., 326 Main St., Rochester, N. Y.

Ten Years of the Marine Motor Industry

(*Continued from page 44*)

fishing schooners of both the Atlantic and Pacific coasts find that a little gas engine beneath decks is a mighty good investment. When the wind falls it enables them to outdistance their competitors in the race back from the fishing grounds and to sell at the top of the market.

The growth of the marine engine industry in the last ten years has not been confined to the United States. Practically all of the foreign markets of the world have been developed. I have no statement of American marine engine export shipments at hand to quote from, but it is a matter of several million dollars annually. Most of the American engine makers have distributors in all parts of the world, and their export business is growing at an astounding rate.

Mechanically the marine motor industry has kept pace with the times. It is hard to point your finger at a certain innovation and say here lies the difference. In the big, broad essentials marine engines are much the same as they were ten years ago, yet when you place a 1907 model of any make beside its sister of 1917 vintage the contrast is striking. You will almost crack your sides laughing at the crude appearance of the old model. And yet they were good engines in their day. They ran well, and a lot of them are still running. The difference between the two is largely the sum of a lot of small refinements, a touch here and there, added from time to time all through those ten years that are gone. Not many of them amount to much when considered separately, but added together they have changed the marine engine from a noisy old rattle-trap to as sweet a piece of machinery as one could wish to see.

And the personnel of the industry hasn't changed so very much in the last decade. Look over the list of leading marine motor makers in MoToR BoatinG of ten years ago and compare it with those of to-day. You will find nearly all the old ones there with some new ones added. No, the marine engine industry hasn't been doing many flip-flops, but it has been growing steadily, substantially, until now it is a pretty big important part of the world's work. It is no longer a child, but a big, two-fisted useful man.

An Ice Box for the Cockpit

(*Continued from page 48*)

servers will be used and fitted snugly all around the inside of the box—granulated cork or sawdust may also be used—but since the chest will be out in the weather, dampness will probably affect their insulating properties to such an extent that solid cork or consolidated cork will be the better bargain.

A lining of No. 22-gauge zinc will be fitted inside the insulation with the drain hole in the bottom at the lowest end. This drain hole is a zinc tube which has a seal or trap fastened to its lower end (also of zinc) which will prevent the chilled air in the ice-box from coming out, but allowing the melt-water to drain off into the bilge of the boat.

This trap is rather important as without it a constant circulation of air coming in around the lid would become chilled and pass out the bottom, melting away the ice very rapidly.

The box will be provided with a light wood grating as per sketch on which the ice will rest. This grating will have an upright piece about four inches high and running across the box to keep the ice in place in a seaway. Shelves will be made No. 18 gauge galvanized iron, with edges bent down for stiffness and will rest on ⅞ x ¾-inch pieces of yellow pine screwed to the sides of the box at the vertical strips shown in the plan.

To keep out the weather the top will be covered with canvas and painted, moulding being placed over the turned-down edges of the canvas so as to extend below the lid. In this way rain water will be kept out of the box. The joints of the wood work should be kept as tight as possible as all leaks in a refrigerator or ice-box mean air circulation between the insulation, and spell inefficiency in maintaining a cold compartment. The box should be given at least three coats of good paint. While the dimensions shown may not be suitable to everyone, they may be altered to fit conditions and spaces, although the general construction will remain the same. The ice capacity of the box as shown is eighty-five pounds.

W. E. M., Philadelphia, Pa.

Yard and Shop

(*Continued from page 59*)

G. E. Thermostatic Metal

The development of the G. E. thermostatic metal by the General Electric Co. of Schenectady, N. Y., has put a new means for warning of undue heat or cold and prompt regulation of the temperature changes into the hands of naval architects, naval constructors and navigators.

G. E. thermostatic metal consists of two strong non-corrosive metals possessing a wide difference in coefficients of expansion, the widest difference possible for any known stable combination of metals. These two metals are firmly attached to each other throughout their entire length, so that there is absolutely no slip of the one upon the other. Thermostatic metal can be cut, stamped or pressed into practically any shape, and when annealed will have all its original inherent qualities; moreover, it will not deteriorate nor take permanent set under applications of heat or force within definite practical limits. The metal is manufactured in various standard thicknesses ranging from 0.25 to 0.015 inches, maximum width of 6 inches and maximum length of 36 inches.

G. E. thermostatic metal is used in the products of many different industries owing to the fact that it can be successfully worked into different shapes and forms. In some of the applications it is used to actuate mechanisms directly by means of the force developed within itself when its tendency toward assuming a curved shape is restrained. In other applications it is used to close and open the contacts of electrical circuits by means of which various devices are operated.

The reliability of this metal has merited its use in thermometers and has gained consideration for it as a compensating device in watch balances, and it is but a step forward to see it used in the proverbially accurate ship's chronometer.

HAVE ELECTRIC LIGHTS

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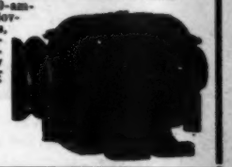

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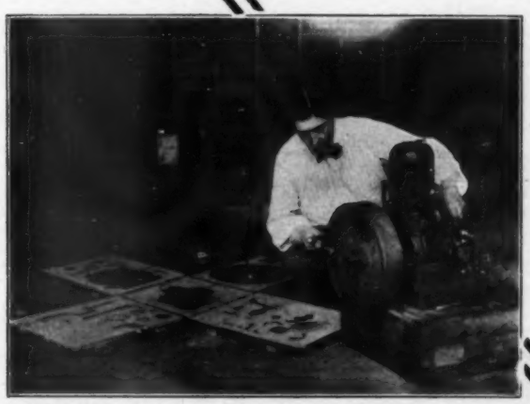

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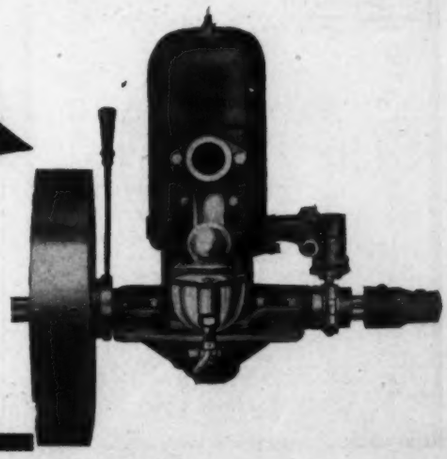

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OUTFITS OF QUALITY

AUTOMOBILES — ALWAYS READY — MOTOR BOATS

DAY OR NIGHT

MANUFACTURED BY
THE LEECE-NEVILLE COMPANY
CLEVELAND, OHIO

Wireless Telegraphy and the Motor Boat

(*Continued from page 35*)

can act in a secretarial capacity. Indeed, there are thousands of boys who have been wireless amateurs and who would welcome the opportunity of spending a few months on board a boat for little or no pay. Which means that one can always get an operator, even when expenses are to be kept down to a minimum, if one cannot find time or does not care to operate the apparatus.

There are available several types of telephone sets for motor boat use. Generally, these sets are available for the larger boats. Further, while one can talk to another station, the answer is always in code except if the answering station is also equipped with wireless telephone. Obviously, the ideal arrangement is the wireless telephone.

Once the wireless equipment is installed and an operator is at work, the motor boat is never out of touch with the world. At different times in the day and night, interesting press dispatches are sent broadcast through space, and these can be picked up by the motor boat operator for the information and enjoyment of those aboard. Weather reports and storm warnings can be received almost anywhere along our coasts. Baseball scores, stock exchange quotations, the most important news of the day—all these forms of news and numerous others are available daily to the small boat equipped with a wireless receiving set. So powerful are the waves sent out by the big Government and commercial stations that they may be picked up by the small craft at distances of several hundred miles. No matter where the motor boat owner may be, he should always be within receiving range of the centers of civilization; which means that he and his guests need never worry about obtaining the latest newspapers.

When a transmitter also forms a part of the station, thus making it a complete one, the operator is not only able to receive but to send as well. He is able to get in touch with other craft equipped with wireless, and when there is nothing more to do, hours can be spent in pleasant chat with other stations. By means of the wireless set, one meets hundreds of persons whom one may never see, and therein lies one of the greatest fascinations about wireless. It is very much the same as being connected on a party line which has thousands of other telephone subscribers, so that there is always something to hear and always someone to talk to.

Aside from the social side of wireless, there is the utilitarian side. Arrangements can be made with commercial stations so that any messages sent to them while out at sea can be delivered to anybody in any part of the world reached by telegraph, telephone or cable. It is quite impossible to over-estimate the convenience and value of having a telegraph office right in one's own ship cabin.

But it is in times of distress that the wireless equipment is most appreciated. For at such times the sinister S. O. S. call when flashed out is certain to bring all ships within hailing distance to the rescue of the wireless-equipped ship in distress. Many lives have been saved by wireless; and many lives have been lost through lack of wireless. Conceivably, there would be less motor boat mishaps if wireless telegraphy were in more general use on small craft.

About a year ago the New York Police Department decided upon the installation of wireless apparatus to be used in the event of failure of telegraph and telephone lines. Three wireless stations were installed in all: One at the Manhattan Headquarters, one at the Brooklyn Headquarters, and one on board the steamer "Patrol." After a year of constant use the wireless system has proved quite up to expectations; and perhaps no better argument in favor of equipping small craft with such apparatus could be found than the case of the small steamer "Patrol."

There are many instances in which the quick means of communication has enabled prompt police service to be rendered, resulting in the saving of much life and property. Occurrences on the water-front where police assistance is required are reported to Harbor A or Headquarters by citizens over the telephone. When the boat is at the pier, it is sent to investigate, and arriving on the scene, it flashes back a report to the Headquarters station operator, who telephones it to Harbor A. When the boat is away from the pier, the orders are given to the wireless operator at Headquarters, who in turn flashes them out to the Patrol, no matter whether she is somewhere off Sandy Hook, or cruising through Spuyten Duyvil.

Recently two barges broke away from the pier at the foot of East 54th Street, New York City, and, driven by a strong wind and tide, swept up the East River and carried three more away from 70th Street Pier. The five barges drifted through Hell Gate in the path of the fleet of steamers that come in through the Long Island Sound early every morning. The Patrol was off Staten Island when this information was forwarded by the Manhattan Headquarters wireless station at four o'clock. At 5.35 A. M., Sergeant Ellis, in command of the Patrol, reported by wireless having found and docked four of the barges, and that the fifth had been secured by a tug. What would have happened had the barges been permitted to remain adrift in the path of the Long Island Sound steamers can well be imagined.

On June 5th last, at 4:35 P. M., the Brooklyn Telegraph Bureau was notified by a citizen that a motor boat off Manhattan Beach was flying distress signals. The Brooklyn wireless operator sent the message to the Patrol, which was then off the Navy Yard, and which immediately started to the rescue. At 5:16 P. M., the commanding officer on the boat inquired by wireless if any further information had been received, and the Brooklyn Bureau, after communicating by telephone with the citizen who had reported the matter, sent the following message to the boat at 5:26 P. M.: "Party in motor boat off Manhattan Beach still waving white flag. Coney Island Life Saving Corps tried to reach them and failed." The Patrol reached the location at 6:15 P. M., just as the launch was taken in tow by a fishing steamer.

On another day at 9:40 P. M., Harbor A was notified by the pier watchman that a lighter had broken away from the West 30th Street Pier, and was drifting up the river. The Patrol then off the Statue of Liberty, was notified, and at 10:15 P. M., reported by wireless that the lighter, carrying a cargo of coffee valued at $50,000, had been returned to the pier. But for this prompt action, the lighter and its valuable cargo might have been lost.

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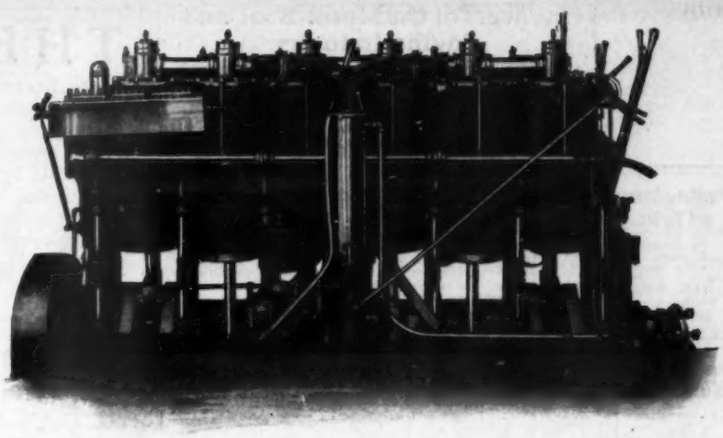

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(Continued from page 12)

25-mile, 60-foot motor yacht. The 52-foot cruiser and the 60 are the largest ever conceived and built by any concern; showing the shops' progressiveness and prominence. The past season, the first for these cruisers, has been particularly successful, eight of the 52-foot models having been sold since the first part of the year. Two of the larger type are in service, while two more are still under construction. At this stage of advancement of the modern motor yacht it is possible for the yachtsman to purchase a craft—built with all the forethought and precision necessary in any object of standard manufacture—afloat, ready and fully equipped for an extended cruise.

Conversion work necessary in the making of yachts suitable for scout patrol is an important factor in the department for repairs and alterations. In an incredibly short space of time a large steam yacht may be reconstructed and adequately equipped to be of service for the purpose intended. The greater number of the yachts so altered were originally built at the Morris Heights plant.

At the present writing preparation is being made for the construction of 1,000-ton mine sweepers for the Government. Three ways have been laid, the necessary new cranes and derricks installed, and for ease of handling material, the spur of the New York Central Railroad has been extended the full length of the yard, all of which will expedite the early completion of these steel ships.

Realization of the value of direct advertising and the business derived therefrom has made the Speedway shops copy familiar to the readers of the better nautical publications. Spasmodic campaigns are not launched, but rather, even, persistent advertising in conjunction with the recommendations of a prominent and discriminating clientele—the kind of advertising that cannot be bought—has made the Speedway shops the peer of all plants where yachts are built.

The personnel of the Corporation is Mr. J. J. Amory, President, Mr. Wm. J. Parslow, who is the Vice-President, Mr. Bruce Scrimgeour, the Secretary and Mr. C. G. Amory, Treasurer.

The Standard Motor Construction Company.

ONLY by looking back and seeing the comparison of ten years ago and now does one realize the tremendous growth of that part of motor boating represented by the Standard organization. But the comparison is interesting for the likenesses shown as well as the differences. One sees that the differences are in degree, the principles the same, and this really brings us to the secret of the successful growth of the organization.

Every successful thing must be founded on solid ground—the fertile soil of character formed of policy and principles. Every business proposition presents a question of economics. The business which most fully meets the largest economic want has the greatest chance of success. This in a marine engine, as interpreted by the founders of the Standard organization is a first cost governed absolutely by the greatest return per year to the engine owner. That has always been the fixed policy of the Standard Company. Its principles ten years ago and now are fair and just action in every transaction, fairness to the Standard owner, fairness to the workers, to everyone who comes in contact with the Standard organization.

Details of design and production rise up from this and grow as does the oak from sound seed in fertile soil. Tenacity to this soil, the fixed purpose to resist temporary influences that would result in a pulling up of roots and transplanting to seemingly greener fields, result in a natural expanding and evolving of details through understanding of each year's lessons and changing conditions.

The natural evolution of the fixed policy to have the first cost of the Standard engine governed absolutely by the greatest return per year to the Standard owner, was Standardization of manufacturing methods to give the greatest possible value for dollar cost. The Standard Company in this, as in other things, was the pioneer and in looking back over ten years the development of Standardized shop methods is a fascinating study in real life.

Building an engine by Standardized manufacture who's first cost is governed by the greatest return per year to the owner has made the Standard's position impregnable, has resulted in it being impossible to meet the world's demands for STANDARD engines even with such rapid expansion of facilities as doubling and trebling output. By these methods the Standard Company was successfully handling large Government orders from the United States, from Russia, Austria and other navies and for large individual consummation throughout the World ten years ago.

The Standard shops now cover a city block. The floor space under cover is over 110,000 square feet. Two railroad sidings run to the property and the whole arrangement laid out for saving of time and labor, for delivery of the raw material to the shipment of the finished product. Practically every part of the Standard engine is made in the Standard shops which are grouped together about the executive offices.

The machines are laid out so that the heavier castings and forgings do not leave the ground floor but pass from one end of the building down to the far end, several hundred feet distant. The lighter parts in the rough are lifted by elevator to the top floors from which they gradually work down from machine to machine until finally delivered to the erecting shop for assembly together into the engine. Gravity is utilized in many ways in transporting parts and air hoists and traveling cranes are installed throughout the shops so that practically no heavy handling has to be done by the operator. Power is furnished by means of electric converters and individual motors on each shop floor so that machines can be instantly thrown in or out of operation. The most modern tools, regardless of first cost, are installed and the equipment cost per operator is extremely high.

The shops to accomplish what the Standard shops accomplished must have the most modern tools, some of which are almost human in their performances, tools which when once set up will turn out stock as long as the raw material is automatically fed to them. The improved technique and finer problems of today *demand* STANDARDIZED manufacturing for accuracy and interchangeability of production and in the STANDARD shops the most highly developed grinding tools are prominent, tools which enable the operator to vary the size of the part he is working to one-quarter of one thousandth of an inch at will or even

(Continued on page 80)

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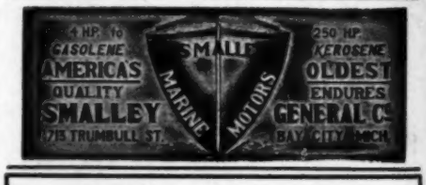

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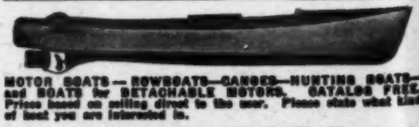

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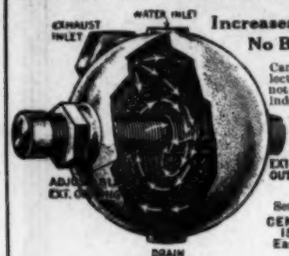

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New York All Large Cities

1917 JOYMOTOR
MORE POWER——LIGHTER WEIGHT

Reversing Propeller—Underwater Exhaust

The best ever for outings, fishing, hunting, vacations Write today for particulars and agency proposition

JOYMOTOR MFG. CO. McCormick Bldg. Dept. 13 Chicago

War Is Declared

on the weeds, rocks, and snags that gives your under water propeller so much trouble. The "Airdrive" will take your boat anywhere it floats. Practical, efficient, economical, quiet, and dependable power for shallow draft boats up to 25 feet. Thrust 95 to 100 pounds. Ask your dealer, or write us. KEMP MACHINE WORKS, 1217 So. Franklin St., Muncie, Ind.

FOR YOUR BOAT
Degrak
Better than Varnish Shellac or Lacquer for Every Purpose. Write for free sample.
KEYSTONE VARNISH COMPANY
2973 Keystone Bldg Brooklyn, N. Y.

The Great 2-Cylinder
KOBAN ROWBOAT MOTOR

Absolutely free from vibration—always reliable—speedy—powerful. Exclusive features—tiller at right side, tilting attachment, non-sensitive carburetor and others. Ask for catalog.

Koban Mfg. Co., 246 So. Water St., Milwaukee, Wis.

Something new in Motor Boat Tops and Equipment. Send at once for our New Catalogue No. 4, just out.
THE C. Z. KROH MFG. CO., TOLEDO, OHIO

Our Tenth Anniversary

(*Continued from page 7*)

York City, and the Michigan Wheel Co., of Grand Rapids, Mich., is too well known to our readers to require comment.

Several others came with us before MoToR BoatinG had passed its first mile-stone and have been with us ever since. Others joined shortly afterward, and as time progressed and as we grew, our happy family grew in numbers, until to-day in this our Tenth Anniversary Number, we go to press with hardly a single representative business house in the field missing from our advertising pages.

As to the future our maxim will be, A Bigger and Better MoToR BoatinG—Attractive, Representative, and Authoritative.

In these moments of rejoicing, we are not unmindful of the conditions of national stress and emergency. For the time being the building of pleasure craft must give way to more serious occupations. But we should awaken to the latent power and possibilities of our boat yards and engine plants. Idleness is a greater sin than extravagance. The solution of the war may rest with the motor boat and its larger sister the motor ship. A navy is useless without a merchant marine. Efficient inland transportation is one of the prime necessities. The railroads are congested, they lack motive power, cars and equipment. The motor boat and motor barge can and must relieve them. The rivers, lakes and other inland waterways as well as the high seas must be utilized. We have the boat yards already equipped and the men trained to operate them. Thousands of motor boatmen are in the Naval Reserve; others are qualified and ready to man the new merchant marine. Why are our boat yards not building government ships, both naval and commercial, instead of idly waiting for something to happen?

The War Tax on Motor Boats

(*Continued from page 56*)

Department, an excise tax to be based on each yacht or boat, at rates as follows: Yachts, pleasure boats, power boats, motor boats with fixed engines, and sailing boats, of over five net tons, length not over fifty feet, 50 cents for each foot, length over fifty feet and not over one hundred feet, $1 for each foot, length over one hundred feet, $2 for each foot; motor boats of not over five net tons with fixed engines, $5.

In determining the length of such yachts, pleasure boats, power boats, motor boats with fixed engines, and sailing boats, the measurement of over-all length shall govern.

In the case of a tax imposed at the time of the original purchase of a new boat on any other date than July first, the amount to be paid shall be the same number of twelfths of the amount of the tax as the number of calendar months, including the month of sale, remaining prior to the following July first.

Pioneers of the Motor Boat and Engine Industry

(*Continued from page 78*)

less if desired, no matter whether this piece is of hardened steel or soft steel. This is one of the most striking advantages of modern manufacturing over the old method, where the operator's tools were limited to cutting tools such as the lathe, planer, etc.

GRAY MOTOR CO.

THE Gray Motor Company was organized in 1905 by Mr. O. J. Mulford, who has been its president since its organization. The first year there were eight sizes of two-cycle engines catalogued, ranging in power from 1½ H.P. single cylinder to 24 H.P. three-cylinder.

Starting with absolutely no organization GRAY motors immediately jumped into prominence because of widespread advertising, inherent quality and conservative price, and at the end of the first year a wonderfully profitable business had been developed and the nucleus of one of the strongest selling and manufacturing organizations in the marine engine business firmly established.

In 1907 some changes were made in the design of the motors, the little 1½ H.P. was dropped, the smallest motor that year being 2½ H.P., and the largest four-cylinder 40 H.P. Improvements were made all along the line, but the same general business policy was adhered to.

During the Fall of 1907 the famous Model "R" and Model "S" lines were developed, and in 1908 these engines were put on the market. At first these engines were built in the same sizes as the 1907 line, that is, from 2½ to 40 H.P. However, during the years from 1907 on this model underwent a few changes, not in design, except in the very slightest degree, by way of refinements; but by added features making for efficiency and economy in manufacture.

As years went by some of the larger sizes of this line were dropped and replaced by the Model "T" line of engines which was brought out in 1910, sizes beginning at 7 H.P. and ranging to 36 H.P., a three-cylinder engine with a 5¼" bore and 5" stroke.

In 1912 the stationary engine business was added to the marine business, and since that time the Gray Motor Company has been manufacturing four-cycle stationary engines in various sizes.

During 1913 the designing of the famous Model "D" engine was undertaken, and this four-cylinder, four-cycle design, with its smaller two-cylinder engine of the same Model, was placed on the market. Later the demand for a smaller four-cylinder, four-cycle became apparent and the marvelous Model "F" was developed and found instant recognition among the owners of high-class boats.

In the Fall of 1916 the Gray Motor Company went into the production of automobile, truck and tractor engines, and is now producing three sizes, of four-cylinder, four-cycle truck, tractor and automobile engines, the 3 x 4, the 3¾ x 5, and the 3¾ x 5.

Since its organization the Gray Motor Company has continually increased its facilities. It is now occupying its fifth new plant just completed on a manufacturing site of over eighteen acres, located on the Detroit Terminal Railway, which serves all the large railways in Detroit.

From the wide variety of engines manufactured during the existence of the Company and knowing the large number of engines sold during this time, the experience in designing, manufacturing and selling is self-evident. It has always been the desire of the Gray Motor Company to keep just one jump ahead in every respect.

At the present time the Company is operating both day and night forces. It has orders booked well ahead.

(*Continued on page 72*)

KENSINGTON ENGINES

High Quality 2½-5 H.P. Low Price

Built where time and labor required to maintain a high standard are not counted in the cost.

No manufacturer could afford to build engines as good as Kensington are built. Limited number made each year. Write to-day for full details.

THE MOTOR SPECIALTIES CO.
Box 1610 Pittsburgh, Pa.

LACY V-8

"Smooth As Velvet"

A new high-speed motor especially designed for the modern Express Cruiser and Runabout.

Lacy Marine Motor Co., 10 St. James Place Rochester, N. Y.

PUMPS

Made by the

Lipman Mfg. Co.

for circulating purposes are the very best. Hundreds of Thousands in use. Send for Catalogue.

233 Pleasant St. Beloit, Wis.

SCORED CYLINDERS **REFINISHED** WITHOUT REGRINDING

We fuse electrically a silver and nickel alloy into the scores making cylinder as smooth and compression-tight as new. Thousands of satisfied customers.

L. Lawrence & Co., 546 W. 45th St., New York
Established 1862 Chicago, 1522 Michigan Ave.
Detroit, 1246 Jefferson Ave. Newark, 290 Halsey St.

CROCKETT'S
Spar Composition

—the original and best known exterior marine varnish in the world. The best Interior Finish is Crockett's

No. 1 Preservative

Send for Catalogue.

The David B. Crockett Co. Bridgeport, Conn.

Metal Adjustable Shaftings

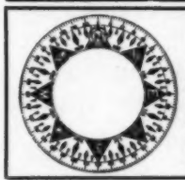
Save power, save trouble. Adjustable from inside of boat. Sizes, ⅝ x 16 in. to 1⅛ x 24 in. Prices $4 to $12.

Double Grip Clutch Couplings

Combination coupling and one-way clutch. Guaranteed to hold. Firm as a flanged coupling. $7.50 to $10.

Write for complete descriptions

THE E. J. LIST MFG. CO., Havana, Ill.



Nautical Instruments

underlighted Compasses, Course Protractors, Bearing Finders. Every navigator should have them. Send for interesting catalogue. Address Box 45, Marine Compass Company, Bryantville, Mass.

MEASURE YOUR BOAT FOR A MASTEN

Improved One-Man Folding Top, Spray Hood, or Cushions, etc.

High quality at lowest prices. Quick service. "Roll-Up" Life Preservers, Kapoc filled, meet government requirements. Best for the motorboat. Write for catalogue and prices.

G. H. MASTEN CO., Inc. 224-226 E. 46th ST., NEW YORK

Masters Boat Speedometers

for motor boats, cruisers and motor ships are carried in stock by leading dealers everywhere.

For descriptive matter write

Irvin W. Masters, Mfr., Muncie, Indiana

MEISEL GEARS

MEISEL PRESS MFG. CO.
957 Dorchester Ave. Boston, Mass., U. S. A.

Yacht Lighting Outfit

A highly developed direct-connected Generator Set. Used on some of the finest yachts built during the past few seasons. Nothing like it in existence, for those wishing a compact and reliable plant suitable for yachts from 40 to 80 feet, operating interior running lights, electric fans, searchlights, etc. The air compressor may be used for whistle, air pressure or water tanks or supplying air pressure for starting engine. Used by U. S. Government on scout cruisers. Send for Bulletin 9008.

R. S. MILLS, 173 LEXINGTON AVENUE BROOKLYN, N. Y.

It's Our Tenth Birthday, Too

NINETEEN SEVENTEEN completes our tenth season in the manufacture of Paragon Reverse Gears. For a full decade we have been meeting the demands and desires of motor boat owners, studying their requirements and developing our product to meet each condition.

And today we can safely say that the Paragon Gear has arrived—that it is *the* gear, the one gear, that best meets the requirements and best matches the quality of the largest and finest marine motors manufactured. Practically all of the prominent boats of the past few seasons were powered with Paragon-equipped motors.

The best proof of Paragon efficiency is the position it has achieved in the marine world—among the builders of America's finest motors. Ask *them*—don't merely take *our* word for it.

Read on the following pages some of the reasons why *you* should have a Paragon Gear in your boat.

PARAGON REVERSE GEARS

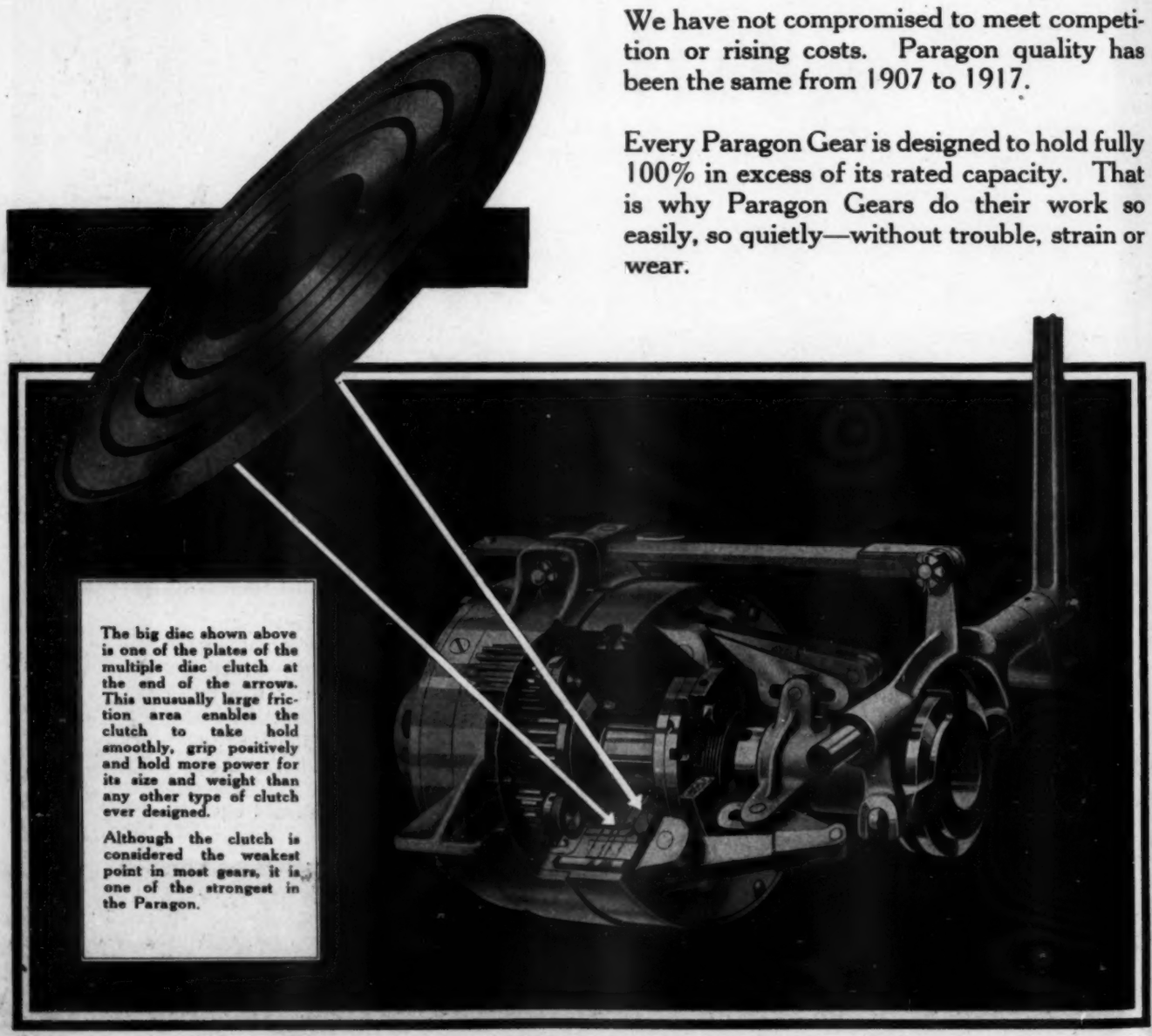
A reverse gear is conceded to be vitally necessary on the up-to-date motor boat, whether the boat be a little launch or a big cruiser or commercial boat. And after you have decided to have a gear, the question is how good a gear does it pay to have.

We contend that the only gear worth buying is **the best gear you can get.** A poor gear is a source of unending trouble. A motor is no better than its gear. A good gear is a source of constant satisfaction. It insures safety, saves time and is the most economical in the end.

Our recognition of these facts has determined a definite policy in the manufacture of Paragon Gears. Our policy is, and has been for the last ten years, to build the most efficient, most dependable gear that modern engineering science could produce.

We have not compromised to meet competition or rising costs. Paragon quality has been the same from 1907 to 1917.

Every Paragon Gear is designed to hold fully 100% in excess of its rated capacity. That is why Paragon Gears do their work so easily, so quietly—without trouble, strain or wear.



The big disc shown above is one of the plates of the multiple disc clutch at the end of the arrows. This unusually large friction area enables the clutch to take hold smoothly, grip positively and hold more power for its size and weight than any other type of clutch ever designed.

Although the clutch is considered the weakest point in most gears, it is one of the strongest in the Paragon.

THE "LIBERTY" GEAR

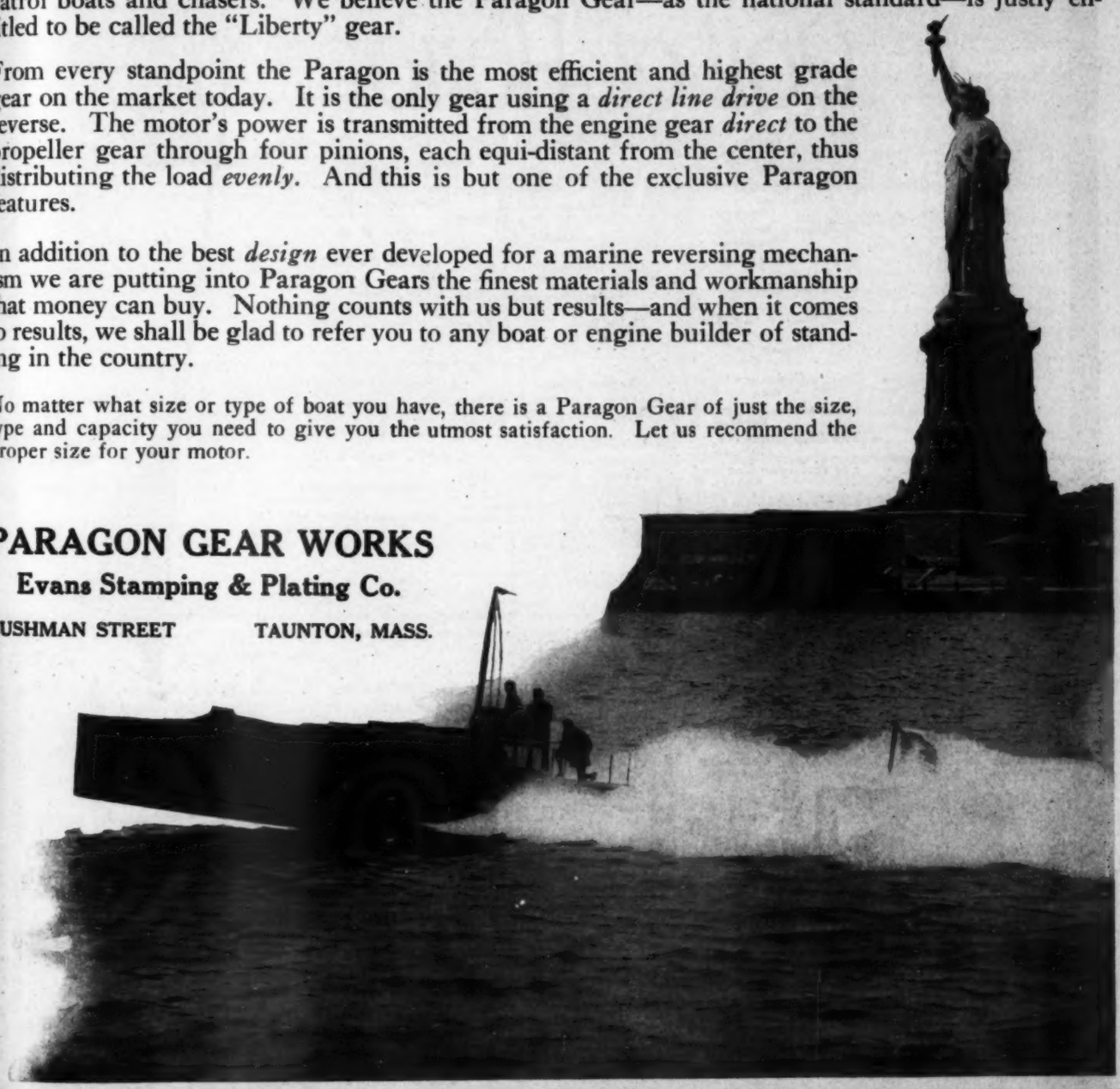
WHEN Uncle Sam designed a standard aviation motor he called it the Liberty Motor. When Uncle Sam designed Standardized trucks for war service he called them the Liberty Trucks.

Uncle Sam is using countless Paragon Reverse Gears in his naval equipment—for launches, tenders, patrol boats and chasers. We believe the Paragon Gear—as the national standard—is justly entitled to be called the "Liberty" gear.

From every standpoint the Paragon is the most efficient and highest grade gear on the market today. It is the only gear using a *direct line drive* on the reverse. The motor's power is transmitted from the engine gear *direct* to the propeller gear through four pinions, each equi-distant from the center, thus distributing the load *evenly*. And this is but one of the exclusive Paragon features.

In addition to the best *design* ever developed for a marine reversing mechanism we are putting into Paragon Gears the finest materials and workmanship that money can buy. Nothing counts with us but results—and when it comes to results, we shall be glad to refer you to any boat or engine builder of standing in the country.

No matter what size or type of boat you have, there is a Paragon Gear of just the size, type and capacity you need to give you the utmost satisfaction. Let us recommend the proper size for your motor.



PARAGON GEAR WORKS

Evans Stamping & Plating Co.

CUSHMAN STREET TAUNTON, MASS.

PARAGON REVERSE GEARS

PARAGON

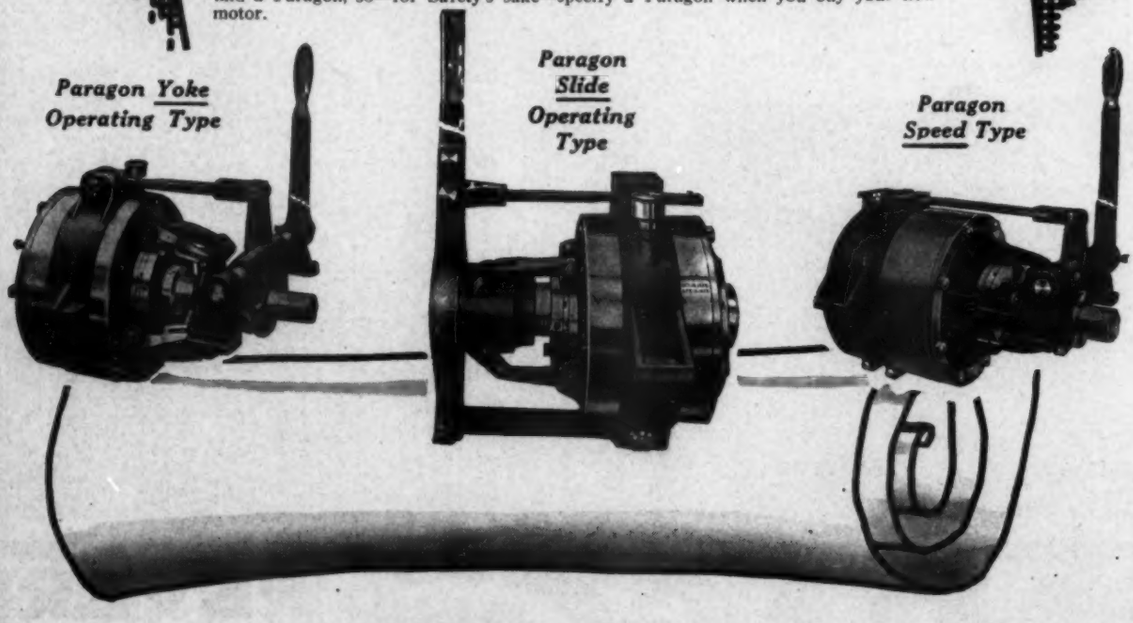
Roll of Honor

Anderson Engine Co., Chicago, Ill.
Automatic Machine Co., Bridgeport, Conn.
C. L. Barker, Norwalk, Conn.
Bridgeport Motor Co., Bridgeport, Conn.
Brown Talbot Mch. Co., Salem, Mass.
Buffalo Gasolene Motor Co., Buffalo, N. Y.
Clay Engine Mfg. Co., Cleveland, O.
H. C. Doman Co., Oshkosh, Wis.
Driggs Ordnance Co., Inc., New York, N. Y.
Duesenberg Motors Corp., Elizabeth, N. J.
The Elco Company, Bayonne, N. J.
Fay & Bowen Engine Co., Geneva, N. Y.
Frisbie Motor Co., Middletown, Conn.
Fulton Mfg. Co., Erie, Pa.
Gaeth Motor Co., Cleveland, O.
J. S. Gaffga & Co., Greenport, N. Y.
Gray Motor Co., Detroit, Mich.
Hall Gas Engine Co., Chicago, Ill.
Hettinger Engine Co., Bridgeton, N. J.
Holmes Cottrell & Sons Co., Westerly, R. I.
Hulse Bros., Greenport, N. Y.
J. W. Lathrop Co., Mystic, Conn.
Mercury Motor Co., New York, N. Y.
Mianus Motor Works, Stamford, Conn.
Miller Engine Co., Chicago, Ill.
Missouri Engine Co., (Oil) St. Louis, Mo.
Murray & Tregurtha Co., Boston, Mass.
Red Wing Motor Co., Red Wing, Minn.
Regal Gas Engine Co., Coldwater, Mich.
Remington Oil Eng. Co., Stamford, Conn.
Sagamore Motor Works, West Lynn, Mass.
Scripps Motor Co., Detroit, Mich.
Sloane Daniel Motor Co., New York, N. Y.
The Stanley Co., Salem, Mass.
Sterling Engine Co., Buffalo, N. Y.
The Torrington Co., Torrington, Conn.
Van Blerck Motor Co., Monroe, Mich.
Venn-Severin Mch. Co., (Oil) Chicago, Ill.
Vim Motor Co., Sandusky, O.
Winton Engine Works, Cleveland, O.
Wisconsin Motor Mfg. Co., Milwaukee, Wis.

—and numerous others.

Note that all the builders of America's highest grade marine engines are here. All these builders use Paragon Reverse Gears on all or nearly all their motors. Each will be glad to send you his catalog upon request.

On cheap engines where price is the sole consideration you cannot expect to find a Paragon, so—for Safety's sake—specify a Paragon when you buy your new motor.



Paragon Yoke Operating Type

Paragon Slide Operating Type

Paragon Speed Type

BOAT OWNERS

WE can save you time and money on Towing, Weedless, and Reversible Propeller Wheels, Reverse Gears, Universal Joints, Rear Starters, Underwater Exhausts, and a hundred and one other motor boat accessories.

We manufacture the best line, and they give the best results, at prices right. Send today for our large free catalog.

MICHIGAN WHEEL CO.
1112 Monroe Ave., Grand Rapids, Mich.

TOPPAN BOATS

Standard for 25 Years

Launches, Dories and Boats of All Kinds Up to 40 Feet

TOPPAN BOAT MFG. CO.
81 Washington St., N., Boston, Mass. Factory: Medford, Mass.

STOCKLESS
NAVY ANCHOR

"Bites Quick"
Holds Fast

Correctly designed — exceptionally strong. Shank of solid wrought iron, forged in one piece; no "pinhole" to weaken it. In holding position it lies at an angle of 55° to the flukes, as per Navy Specifications. One-piece head—no pockets to bring mud on deck—and its "tripping fin" absolutely prevents anchor from dragging "flukes up." Heavily galvanized by hot process. Proper sized shackle with each anchor. At your dealer's or write us.

"It Pays to Buy Our Kind"
Est. 1847

WILCOX, CRITTENDEN & COMPANY, INC.
Trade Mark Registered
4 S. Main St., Middletown, Conn.
Mfrs. of the Famous Maxim Motor Boat Silencers.

Easiest to Install The "OFFSET" Strut

Patent Pending

No Bushings—No Babbitt

Simple, strong and trouble proof. Lasts as long as the boat. Long bronze shaft bearing that outwears any other kind. Made of best manganese bronze complete or with steel arm for fresh water use.

Write for description and give detail of your boat for prices.

The entire bearing swivels in the arm.

McFarlan & Spilker Manufacturing Co. Cincinnati, Ohio

EXCELSIOR PROPELLERS

ESTABLISHED 1910

The propeller without an equal. They are superior to any propeller produced. They are used extensively by all the leading Aviators. Large stocks and prompt shipments. NO GRADES. THE BEST AT THE SAME PRICE FOR ALL. BOOKLETS FREE.

EXCELSIOR PROPELLER COMPANY
ST. LOUIS, MO.

WHITE FOR SAFETY
"RED SPOT" SEARCHLIGHT
RED FOR DISTRESS

MOST PRACTICAL MOTOR BOAT SEARCHLIGHT MADE

WHITE FOR SAFETY—for navigating dark and unfamiliar channels, avoiding rocks, picking up buoys, making landings, etc. A powerful penetrating light that carries far and insures safety at night.

RED FOR DISTRESS—simply press a button and produce a brilliant red light that is as effective as red fire for a distress signal and is visible for miles.

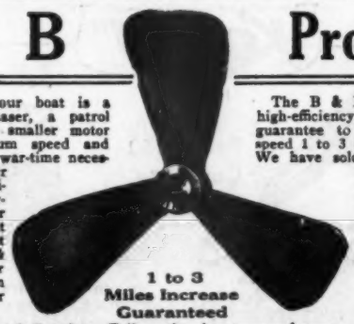
The Red Spot can be operated on regular lighting system, storage or multiple dry battery. Diameter 5¼", height 10". Easily removed from base for stowing away.

No. 1615 Red Spot Searchlight complete with 6-8 volt lamp, weatherproof cord with copper terminals attached. **$6.50**

Order a "Red Spot" through your dealer, or direct from us. We also manufacture running lights and cabin brackets.

The F. W. Wakefield Brass Co.
118 Water Street Vermilion, Ohio

B & B Propeller



Whether your boat is a submarine chaser, a patrol cruiser or a smaller motor boat, maximum speed and efficiency are war-time necessities. Whether you desire efficiency for pursuit, racing, or just to beat the high cost of fuel, a B & B Propeller should be on the end of your shaft.

The B & B is strictly a high-efficiency wheel. We guarantee to increase your speed 1 to 3 miles per hour. We have sold thousands of wheels under this guarantee. Every buyer has had the privilege of returning the wheel. That alone is sufficient proof of B & B efficiency.

1 to 3 Miles Increase Guaranteed

Order a B & B today. Tell us the size, type and power of your boat so we can recommend the right size wheel.

Write today for catalog

BRYANT & BERRY PROPELLER CO., 106-108 Hague Ave., Detroit, Mich.
Eastern Representatives: E. J. Willis Co., 85 Chambers St., New York, N.Y.
Canadian Sales Agents: Canadian Fairbanks-Morse Co.
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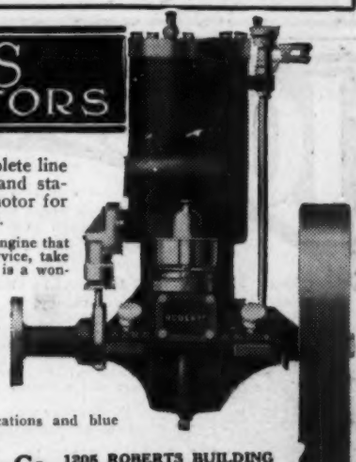
ROBERTS MOTORS



We build a complete line of motors, marine, aircraft and stationary. We have the right motor for your boat at the right price.

For a Heavy Duty Fisherman's engine that will stand the hardest kind of service, take a look at this Roberts Motor. It is a wonder for power, strength and dependability.

The Bore is 6", stroke 6½", developing 8 H.P. at 300 R.P.M. and 10 H.P. at 400 R.P.M. Operates on either gasoline, kerosene or distilate. Furnished with either Jump Spark or Make-and-Break Ignition.

Write today for prices, specifications and blue prints.

Roberts Motor Mfg. Co. 1205 ROBERTS BUILDING SANDUSKY, OHIO

STEARNS McKAY

MARBLEHEAD ANTI-FOULING GREEN BOTTOM PAINT

FOR STEEL OR WOOD STAYS CLEAN

SPEED AND EFFICIENCY

MARBLEHEAD ANTI-FOULING GREEN

STEARNS-McKAY MFG. CO., Marblehead, Mass.

"The Light that never fails"

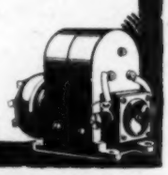
HENRICKS EUREKA

Electric Lighting Outfits for Motor Boats

THERE'S one thing about these lighting outfits of ours; they're built to give you even more service than you expect. They serve a double purpose; light and ignition; both important and both sure with Henricks back of them.

These Outfits must do all that we say they will and be all that the name Henricks stands for: Quality, Service, Economy.

Get our booklet; there's a Henricks outfit made for your boat.



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1206 St. Paul St. Indianapolis, Ind.

Never-Leak Tanks

for Storing Gasoline Water Air or Oil

A "Safety-First" Tank for Motor Boats and Yachts

"Never-Leak" Tanks are made of one length of suitable gauge sheet steel, with heads and tappings welded in the shell. Galvanized thoroughly inside and outside after tank is made up, insuring an even, unbroken coating. Welded construction throughout. A large stock on hand for immediate delivery.

MARINE EQUIPMENT AND SUPPLY CO.

610 ARCH STREET Philadelphia, Pa.

LOBEE CIRCULATING & BILGE PUMP

For 17 years Lobee Pumps have been depended on in places where a single failure in operation might cause serious loss. They have set the world's standard of dependability and efficiency.

Lobee Pumps are simple, noiseless, compact and positive. They are used on many big engines and big boats, including several of the fastest racing boats afloat. Gear and Rotary Pumps from ¾" to 1½" suction and discharge. Various types of drive and mounting to order.

Write today for catalog and prices.
Sold by leading dealers everywhere.

Lobee Pump & Machinery Co., 57 West Bridge Street Buffalo, N. Y., U. S. A.

EVER-WARM SAFETY-SUIT

The Real Life Preserver

YOU CAN'T DROWN! YOU CAN'T CHILL!

Every one contemplating travelling on water, whether ocean, river or lake, should provide himself with this, the real life insurance policy, which protects the wearer from exposure and saves from drowning. This suit should be considered the most indispensable article in your entire outfit.

It is a one-piece garment, completely enveloping the body; can be slipped into in less than a minute. It supports the wearer for an indefinite period, at the same time keeping the body *warm, dry* and *comfortable.*

The suits are being supplied to passengers on the large transatlantic steamships, private yachts, the War Relief Commission, Patrol Squadron boats, and Hospital Units leaving for the war fields.

Send for Booklet, Price List and Order Guide.

Simply step into it

LIFE PRESERVER SUIT CO., Inc.
(Sole Agents for U. S., Canada and Foreign Countries.)
Suite 805-6-7, 11 Broadway, New York
Phone Bowling Green 8764.

SILENT DRIGGS

A Marine Engine which combines Silence and Power

Incorporates a silent and thoroughly efficient rotary valve which is always gas tight and silent and can never stick.

Write for illustrated catalogue Department B

Driggs Ordnance Company, Inc.
120 Broadway New York, N. Y.

HEINZE

HECO

High Tension Magneto
Original in Design
Superior in Quality.

HECO

FACTORIES Lowell, Mass. BRANCHES New York

known users better

by all as the Magneto

SALES OFFICES Detroit, Mich. BRANCHES Chicago

HEINZE ELECTRIC COMPANY

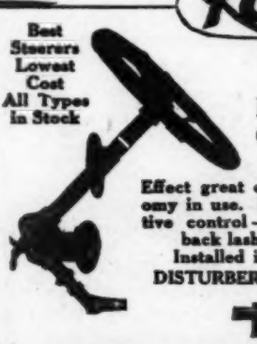
Kaizer

Patented

Best Steerers Lowest Cost All Types in Stock

Self-Locking STEERERS

Price, $40 Complete



Effect great economy in use. Positive control — no back lash Installed in DISTURBER IV

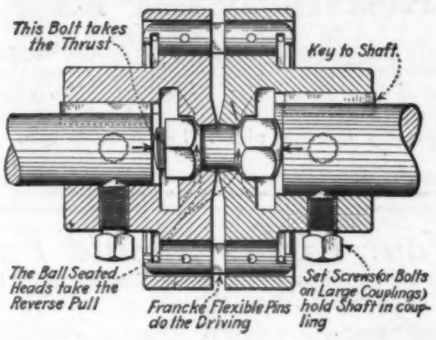
We also manufacture All Cast Bronze Concealed Wire Searchlight with Patented Control Rope Steerers Marine Fittings

GEO·B·CARPENTER & Co. 440 Wells Street Chicago, U. S. A.

ELIMINATE MISALIGNMENT FRICTION

WITH A

Francke Flexible Coupling


This Bolt takes the Thrust
Key to Shaft
The Ball Seated. Heads take the Reverse Pull
Francke Flexible Pins do the Driving
Set Screws (or Bolts on Large Couplings) hold Shaft in coupling

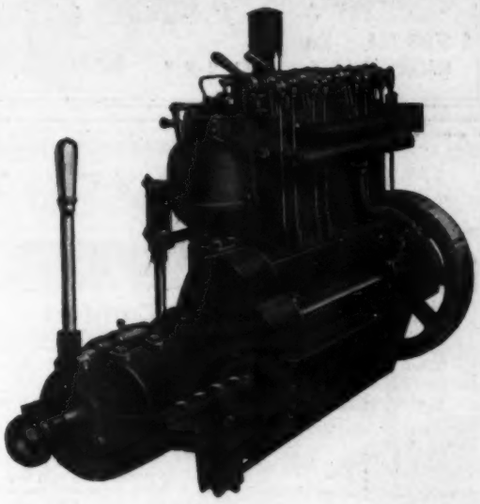
When rigid couplings are used, misalignment will bind the shafts in their bearings. Leaky stuffing boxes often result. Bearings heat and wear. Shafts break. The engine does not develop maximum power at the propeller. Eliminate the misalignment friction and you will cure most of your troubles.

Smith-Serrell Co., Inc.
General Sales Agent for The Francke Co.
West St. Bldg., New York City

Quayle OIL MOTORS Pay for Themselves In a Year

Use the cheapest oils.
Start and operate on any oil that flows freely.
No carburetors, batteries, magnetos or ignition devices of any kind.
A real oil engine—not a "made over" gasoline engine.

QUAYLE MOTORS COMPANY
38 South Dearborn St., Chicago U.S.A.



"NORMA" BALL BEARINGS
(Patented)

Failure of a bearing in the magneto is equivalent in effect to engine failure. Failure of a bearing in a lighting generator is in effect a failure of the lighting system. Either will surely mean dissatisfaction—either may mean disaster, possibly loss.

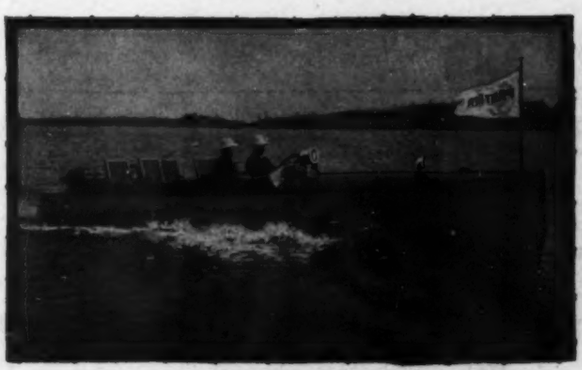
The proved speed-and-service qualities of "NORMA" Ball Bearings have resulted in their adoption as standards by practically all makers of high-grade magnetos and lighting generators —those used on boats of the better class.

Be SURE. See that your Electrical Accessories are "NORMA" equipped.

"NORMA"

THE NORMA COMPANY OF AMERICA
1790 BROADWAY NEW YORK
BALL, ROLLER, THRUST AND COMBINATION BEARINGS

IT IS HIGH TIME TO SELECT YOUR MOTOR BOAT FOR THE COMING SEASON



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Racine Wis TRADE MARK REG.
MOTOR BOAT

Racine Wis boats are backed by 21 years of boat building skill and experience.
The name "Racine Wis" is the "Sterling" hallmark of boatdom.
Write for our catalogue of Speed and Semi-Speed boats, family motor boats, cruisers, row-boats, and the finest canoe in America—the Racine Wis. Please state the type of boat in which you are interested when writing.

RACINE BOAT COMPANY
1615 Racine Street Racine, Wisconsin, U. S. A.

RENAUD "8 Cyl."

Speed 25 miles per hour Guaranteed

20′ x 5′ Standardized V-Bottom Runabout, $1500. Complete

A handsome speedy little boat, sturdily built and beautifully finished. Mahogany decks, trimmings and instrument board of improved type. White pine planking. Leather upholstery. Front seats divided.

Equipped with 35-40 H.P. motor, electric starter, generator, battery, electric lights, electric horn, auto steering gear. Up to the minute in every detail. Several boats in stock for immediate delivery. $1500 F. O. B. Detroit.

Renaud Boat Works, 225 Grand Ave., East, Detroit, Mich.

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Cruising Comfort

—a graceful, sturdy craft that ploughs the sea with perfect ease and limitless power; grips the water tenaciously yet glides along without lost motion, entirely free from toss of tempest or "whip" of wind.

Completely able and supremely sea-worthy—a pride and pleasure every knot of the trip, bringing you safely home with keen anticipation for the next cruise. That's the story of

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Built to order from your plans or our designs, as you prefer. Full of comfort and character,—"A Country Home Afloat."

Everything in boats from K/D to complete outfit. If quality counts with you, write us. You'll like our complete story.

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North Tonawanda, N.Y.

If Your Lights Should Fail!

Think what it might mean, in midstream, on a black night! Don't risk it. Put a

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Model 301 AMMETER

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It keeps you posted every minute regarding the recharging or discharging of your storage battery, warning you *before it is too late* whether your battery is being maintained in the condition which will assure you perfect service. Write us—let us tell you about it.

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23 Branch Offices in the Larger Cities

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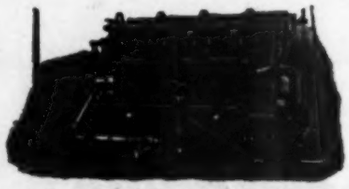
Established 1849 LOUIS DUSENBURY & CO., 229-233 Fourth Ave., N. Y. City



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Gasoline Yachts and Engines

NOTED FOR RELIABILITY

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STEAM LAUNCHES AND ENGINES
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MURRAY & TREGURTHA CO.
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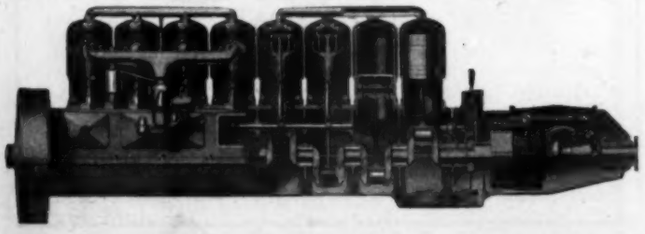

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Four Cycle Type. 5 to 200 Horsepower. Made in 2, 4, 6 and 8 Cylinders.

For Cruising, Racing, Fishing, Freighting

Smooth, well-balanced and symmetrical in design, powerful and thoroughly dependable in operation, they are the embodiment of the best engineering effort.

OVER 11 YEARS' SUCCESSFUL SERVICE THROUGHOUT THE WORLD.

The strongest possible guarantee by a company thoroughly responsible, financially, stands behind every NIAGARA. You will never regret it if you

PUT THE POWER OF NIAGARA IN YOUR BOAT.

NIAGARA MOTORS CORPORATION
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Waterproof Upholstery

You can't avoid water-stains or grease-marks aboard boat, but you *can* get upholstery that is water, dirt and grease proof—upholstery that can be instantly wiped spick and span with a damp cloth.

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CRAFTSMAN QUALITY

is ideal material for boat upholstery. Its leather-like surface has the luxurious appearance and softness of fine leather. It is extremely durable and will wear longer, give greater service and look better in the long run than any upholstery material you can choose.

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for Motor Boat Tops

is the last word in strength, lightness and waterproofness. It is made in single texture, with Fabrikoid Surface or Fairfield Rubber Surface; both are sincerely guaranteed for one year against leakage.

Write for samples and booklet.

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Wilmington, Delaware.
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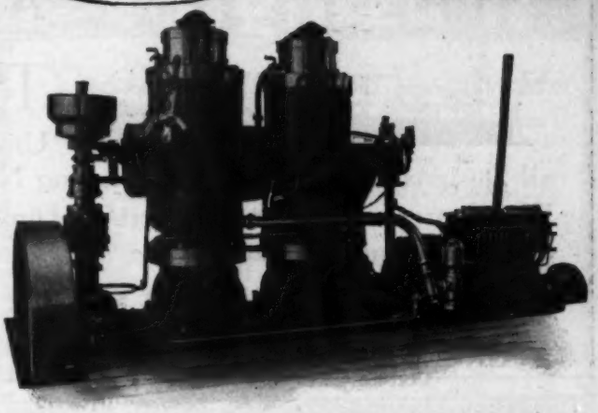
Canadian Office and Works, Toronto.
World's Largest Makers of Leather Substitutes

Kahlenberg HEAVY DUTY CRUDE OIL ENGINES



Positive Governor Control from no load to full load. Will run idle any length of time and pick up full load instantly without losing a single impulse.

You carry only one kind of fuel (crude oil) which is used for starting and operating.

Built in sizes 60 H. P. and up.
Send for descriptive circular today.

Kahlenberg Standard engines in medium and heavy duty types are made in sizes from 2 to 54 H.P. and we would strongly recommend them for operating on KEROSENE, SOLAR OIL and GAS OIL. You ought to know more of the exclusive advantages the KAHLENBERG offers you. "Send for catalog."

Write today for full details.

KAHLENBERG BROS. CO., Manufacturers
12th and Monroe Streets — TWO RIVERS, WISCONSIN, U. S. A.

Burn Cheap Oil

in a

Semi Diesel

MISSOURI OIL ENGINE

Would you pay 25 cents a gallon for gasoline if you could get it for 5 or 10 cents? Would you pay $12 a ton for coal if you could buy it for $2 or $3 a ton? Consider your power cost in the same way—investigate the most economical power plant in the marine field and we are satisfied you will buy a Missouri Oil Engine.

The Missouri Engine is not a makeshift converted gasoline engine of the conventional type, but a genuine oil engine of the most approved Semi-Diesel type, designed for heavy oil fuel particularly. It operates on Crude Oil, Solar Oil, Fuel Oil, or Benzine, and is as dependable on any of these fuel as the highest grade heavy duty gasoline motor.

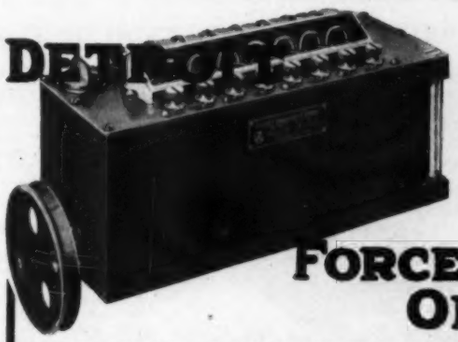
The Missouri is simpler than most gasoline and gas engines. It has no carburetor, batteries, wires or magnetos. The liquid fuel is injected by pumps. It is easy to start and easy to run.

The price of the Missouri Engine is high enough to insure the best of design, materials and workmanship. The running expense is so much lower than any other type of motor that it is the best power investment you can make.

One to four cylinders. Seven to thirty horsepower.

Write today for full details

MISSOURI ENGINE COMPANY
2808 North Eleventh Street — St. Louis, Mo.



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BUILT BY THE WORLD'S LARGEST MANUFACTURERS OF LUBRICATING DEVICES

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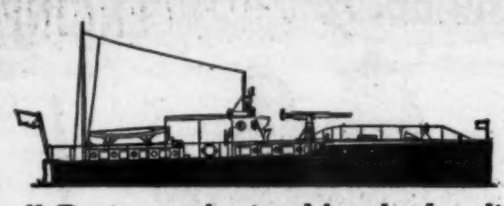

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THE LUDERS design for a 65-foot express cruiser of Coast Defense type has been accepted by the United States Navy Department as the Best Type of all Designs submitted by the Leading Naval Architects of the country.

We are prepared to accept orders for Duplicates from Yachtsmen who will appreciate what this achievement means.

LUDERS MARINE CONSTRUCTION CO.
STAMFORD, CONN.

WICKER-KRAFT Yacht Furniture

Fit out your yacht or motor boat with the genuine Wicker-Kraft, the original wicker furniture to be designed especially for high grade boats of all types.

There are special types of Wicker-Kraft for cabin cruisers, day cruisers, express runabouts, launches, rowboats and canoes. Each design is just suited to its purpose, and each piece possesses the excellence of design, materials, workmanship and finish which has made Wicker-Kraft the most popular brand of furniture in the marine field.

Wicker-Kraft is regularly used by the leading builders of high class boats—builders who cater to the most discriminating boat owners and who buy only the best products the market affords. Among these are Albany Boat, Great Lakes, Niagara, Seabury, Elco, Fay & Bowen, Luders, Matthews, Lawley and many others.

Write today for illustrated catalog and prices. The popular idea of enclosing a life preserver under the seat of a chair is an original Wicker-Kraft feature.

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H. G. Pratt, Proprietor Newburgh, N. Y., U. S. A.

IMPROVED MOTOR BOAT CLOSET

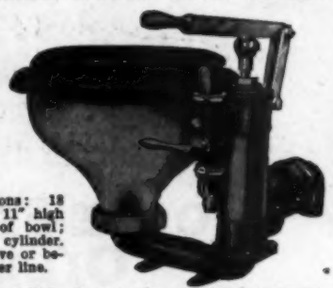


Figure 1404

Dimensions: 18 x 18 x 11" high to top of bowl; 2½" cylinder. For above or below water line.

The best little closet on the market today, possessing many of the advantages of the large size toilet. All brass and porcelain. Oak seat and cover.

All prices subject to market advances, which are continually changing.

Price $25.00

The J. H. Curtiss Co.

Pioneer Specialists in Marine Sanitary Fixtures

Since our advertisement appeared in the first issue of MOTOR BOATING, December, 1907, hundreds of Curtiss fixtures have been installed in motor cruisers and yachts of all sizes, including some of the finest boats launched within this period.

The Curtiss line is exceptionally complete, varied in type, size and price to meet every possible requirement. Each model has been designed in accordance with our wide experience in boat work and can be depended upon in quality, service and durability no matter whether it is our highest or lowest priced model.

With Pump

Lining and Fixtures Nickel-plated. Porcelain Bowl. Mahogany or Quartered Oak Case.

Cock on pump swings upward, thus preventing breaking of bowl. Soap-dish is porcelain and removable.

No. 5
Height, 19 inches.
Width, 19 inches.
Depth Closed, 6 inches.

Quartered Oak Case, Each...$42.50
Mahogany Case, Each..... 44.00

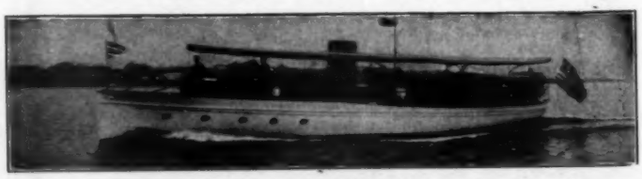
Fig. 1392

THE J. H. CURTISS CO. 2 South Street, New York

20th CENTURY Gasoline Motors

2-Cylinder—6½" x 8½"—15-20 H.P.—400 R.P.M.
4-Cylinder—6½" x 8½"—40-50 H.P.—400 R.P.M.
6-Cylinder—6½" x 8½"—65-75 H.P.—400 R.P.M.

Strictly high grade four-cycle engines, built for heavy duty service.



65 ft. x 14 ft.—JINETTA—J. H. Bocker

Most yachtsmen know of the satisfaction given by yachts designed, built and powered by us; our experience is at your command; plans on file of all size yachts.

Send Us Your Inquiries

NEW YORK YACHT, LAUNCH & ENGINE CO. :: Morris Heights, New York City

"Never Fails to Grip"

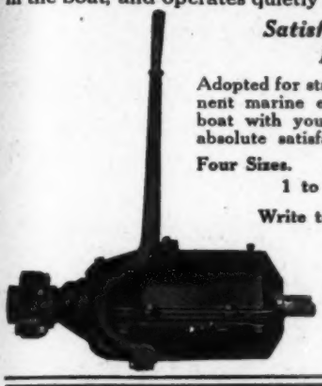
"THE GEAR THAT HANGS ON"

BULL-DOG REVERSE GEAR

The first and most important qualification of a reverse gear is to hang on to its load, to hang on like grim death, in order that the power of the motor may be transmitted to the propeller without losing an ounce of energy.

The Bull-Dog Reverse Gear is well named. It hangs on like a bull dog and gives you all the advantages of a reliable reverse, a free engine clutch and a forward drive that is as positive and dependable as a solid shaft and coupling.

The Bull-Dog is smaller for its capacity, more compact, simpler, lighter and more accessible than any other reverse gear. It is completely enclosed and oil-tight, takes little room in the boat, and operates quietly without heating up.



Satisfaction Guaranteed or Money Refunded

Adopted for standard equipment by several prominent marine engine builders. Try one in your boat with your old engine. We guarantee you absolute satisfaction—can you ask more?

Four Sizes. **Iron or Aluminum Case.**

1 to 64 H.P. per 100 R.P.M.

Write today for catalog and prices.

Kennedy Machine Company
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Detroit, Michigan

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High Grade Auto Steerers

We make an exceptionally high grade line of Auto and Bridge Deck Steerers for runabouts, auto boats and cruisers. They are strong, safe and easily operated. Solid brass steering post inside outer tubing; spark and throttle controls built in the steerers—both levers inside the wheel. Furnished with Rack and Pinion; with Drum; or Drum with direct S. & T. Controls. We also make Single Post Auto Steerers similar in design to the above and at a little lower price. At your dealer's or write us.

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"Sea Craft Suggestions and Supplies" — enlarged edition — 216 pages. Full of useful ideas—bearing the compass, proper ground tackle, hints on steering gear. Mailed only on receipt of 25c.

World's Largest Mfrs. of Marine Hardware

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WILCOX, CRITTENDEN & COMPANY, INC.

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BURN KEROSENE

In Your Motor

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Cut your fuel cost 60% to 70% and get more power, the same flexibility and absolute freedom from carbon with the

OLSEN VAPORIZER

Can be easily attached to any 1" to 3" carburetor. Burns clear kerosene to the last drop. Constant use under all sorts of conditions has proven its superiority over any kerosene carburetor on the market. The Olsen has never failed to give maximum flexibility and all round satisfaction. Adopted as standard equipment by several manufacturers for next year.

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Our Guarantee—Full Cost Refunded in 30 Days on Request

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POWER

Wisconsin Motors are known for their ability to get maximum power out of every gallon of gasoline. Quiet, smooth running, light and compact, they are the product of the highest type of engineering skill.

Wisconsin Motors
CONSISTENT

for marine use contain those same qualities that have made Wisconsin Racing Motors champions of the world on road and speedway. If it's a Wisconsin it's a consistently dependable motor.

WISCONSIN MOTOR MFG. CO.
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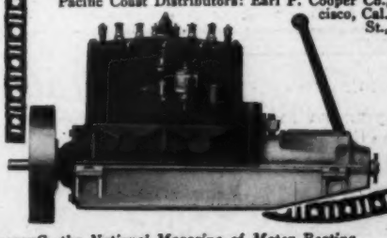
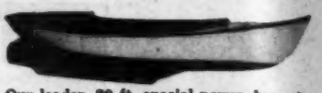
New York Branch: 21 Park Row, T. M. Fenner, Factory Representative.
Pacific Coast Distributors: Earl P. Cooper Co., 1428 Bush St., San Francisco, Cal., and 1310 So. Los Angeles St., Los Angeles, Cal.



Four, six and eight cylinder types. Write for specifications.

CAPE COD POWER DORY CO., 455 Main St., Wareham, Mass.

GURNEY DESIGN *Other Boats we build:*
- 16-Foot Lake and River Boat
- 17-Foot Sail Dory
- 21-Foot Runabout
- 30-Foot Cruiser
- Life Saving Dories
- 24-Foot Cabin Cruiser, Dory Type
- 10, 12 and 14-Foot Rowing Skiffs
- 14-Foot Size for Outboard Motor
- 17-Foot Launch



Our leader, 20 ft. special power dory, the safest little family boat built. Will stand the ocean waters.

Write for literature on boat interested in. NO PATTERNS OR K. D. FRAMES.
All these boats are of Standardized Construction. It means a better boat at a lower price.
Don't build to order when you can get a better boat of Standardized Construction at lower cost.

Frederick S. Nock
NAVAL ARCHITECT AND YACHT BUILDER

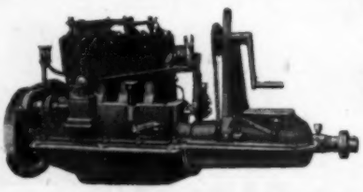
Motor, Steam and Sailing Yachts
One of the advertisers in the first issue of MoToR BoatinG, December, 1907

Marine Railways, Storage, Building and Repairing
Estimates for Designing or Building furnished on application

EAST GREENWICH RHODE ISLAND, U. S. A.

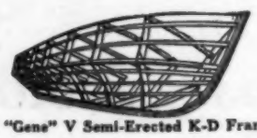
THE 1918 UNIVERSAL

Has all the attractive features of the 1917 model with a few refinements. It is the ideal motor for one class racers. Just as suitable for work boats or for trolling. Get Bulletin No. 25 and learn the features of this popular motor.



Universal Motor Co.
Oshkosh, Wis.

"GENE" V BOATS



A "Gene" V Semi-Erected K-D Frame.

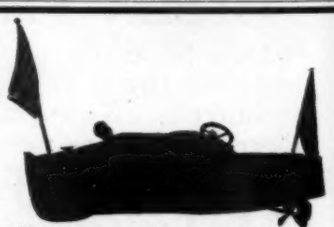
A "Gene" V Planked Hull crated for shipment.

LET us quote on a Gene "V" Boat of the type you prefer. Cruisers, House Boats, Work Boats, Fast Passenger Boats, Runabouts, Speed Boats, Shoal Boats, Row Boats. Four qualities: Plain, Regular, Semi-Deluxe and Deluxe.

We also furnish all these in knocked down, semi-erected and planked hulls. Write today for details.

"Gene" V Boat Co.
311 Main St. Cincinnati, Ohio

"Dum Dum," a military type, "Gene" V sea runabout. 14-20 H.P. Red Wing motor. 18 miles per hour.



"Ace," 12 h. p., 22 miles per hour guaranteed. Built of genuine mahogany.

"High Ball II," 32 feet, 18 h. p., Red Wing, guaranteed 10 miles per hour.

Profitable Advertising

consists of placing your selling message before the greatest number of possible buyers.
MoToR BoatinG has the largest guaranteed circulation in the marine field, reaching boat owners exclusively and of a class who can **afford to buy** what you want to sell. **Write for rates and information.**

MoToR BoatinG, - - - - - 119 West 40th Street New York City

Your Motor-

"LUNKENHEIMER Equipped"

Is a safeguard against those vexatious experiences which break operating schedules and spoil the pleasures of motor boating.

Each device of our extensive line is a practical design, durably constructed; and will give continuous satisfactory service with the greatest safety and economy.

The best boats everywhere are "Lunkenheimer-equipped."

Your local dealer can supply you; if not, write us.

THE LUNKENHEIMER CO.
"QUALITY"

Largest Manufacturers of High Grade Engineering Specialties in the World

CINCINNATI

New York Chicago Boston London

Write for Catalog No. 4-CC.

29-17-33

R. M. Hvid Company

LICENSER OF THE HVID OIL ENGINES

First National Bank Building, :: Chicago, Ill.

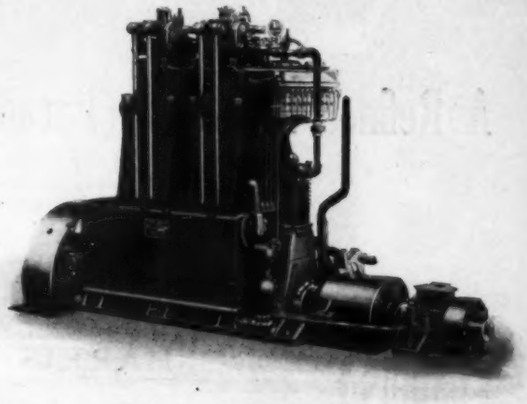
We solicit correspondence regarding license to manufacture engines under patents owned by us.

"HVID ENGINES RUN ON ANY OIL WHICH FLOWS FREELY"

Highest fuel economy. Extreme simplicity.
Absolute reliability in operation.
No preheating or starting on gasoline at any time.
No ignition devices of any kind. No carburetors.

The simplest and most reliable engine built.

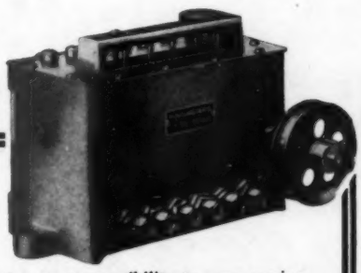
Thousands in use now in sizes from 1½ B.H.P. to 100 B.H.P. per cyl.



View showing a 2-cylinder, 20 B.H.P. Hvid Oil Engine as built by the Burnell Engine Company, South Bend, Ind.

R. M. Hvid Co., First Nat'l Bank Bldg., Chicago, Ill.

Oil Is Cheaper Than Engines



A cent's worth of oil at the right place would often save ten dollars' worth of repair work. Perhaps you have never failed to supply the oil, but your responsibility to your engine does not end until you have provided the surest possible means of getting that oil to the right place, at the right time.

Manzel Forced Feed Oilers

furnish the most dependable system of lubrication known. They can never fail because the oil is forced through each feed under pressure by a powerful pump which is driven by the engine itself. Manzel Pumps are made in a complete variety of sizes and styles, from one to fifty feeds, to fit every kind of marine engine manufactured. Any style of drive.

Write today for copy of this free booklet on lubrication. You'll find it well worth reading.

MANZEL BROTHERS COMPANY

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THE JASCO TANK

Is an absolutely leakless carrier for gasoline. It is made of the finest quality steel, is seamless, tinned and tested and is made in styles and sizes to suit any type of motoring craft.

It prevents accidents due to leaking gasoline and gives you the use of every drop of your fuel. Look into the proposition of "Safety First" as applicable to your boat.

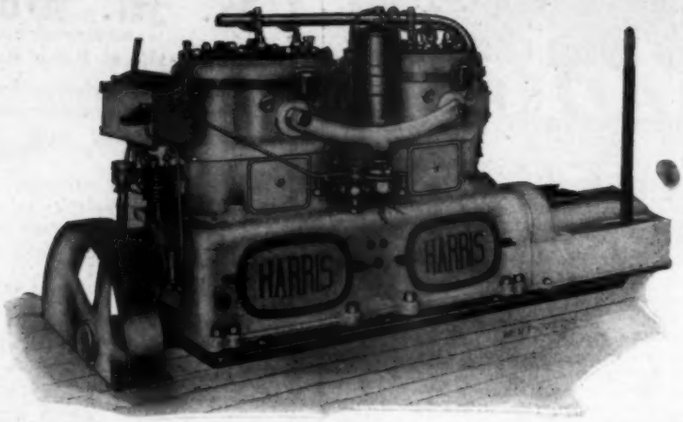
Write for detailed literature. We will be pleased to send it to you together with our full color marine signal card.

JANNEY, STEINMETZ & CO.

Main Office: PHILADELPHIA

New York Office: Hudson Terminal Building

HARRIS



HARRIS

A Refined Kerosene (Paraffin) Engine—Four Cycle Heavy Duty

Harris Heavy Duty Engines are absolutely high-grade, up-to-date modern engines, embracing all the latest improvements of merit. They cost more than other marine engines due to the excellence of materials and workmanship.

Gasoline engines from six to two hundred twenty horsepower. Kerosene (paraffin) engines from forty to two hundred twenty-five horsepower. Especially suited for foreign service.

Write for Bulletin No. 1

HARRIS

HARRIS

HARRIS ENGINE COMPANY

WILMINGTON, DELAWARE, U. S. A.
Domestic Office: 476 Canal St., New York City
Export Office: No. 47 Broadway, New York City, J. E. Sitterley, Mgr.

PATENTS Established 72 Years

TO ensure the stability of a manufacturing concern it is of utmost importance that its products or new equipment be protected to the limit against imitation by competitors. We are now acting as PATENT ATTORNEYS for many of the representative business enterprises in the country and shall be pleased to have you consult us relative to securing patent protection on your new devices.

Our staff is composed of expert attorneys with many years' experience in the preparation and prosecution of patent applications, thereby insuring the best possible protection for the inventions of our clients.

All patents issued through this office are published in the SCIENTIFIC AMERICAN without charge to the patentee.

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MUNN & COMPANY

Patent Attorneys

625 F St., N. W.
Washington, D. C.

621 Woolworth Building
New York City

King of Marine Carburetors

KINGSTON
THE WORLD'S MOST POPULAR
CARBURETOR

The Kingston is today the world's most popular carburetor.

So far as we know we are now producing more carburetors than any other manufacturer in this line, and this is not the time of year for our maximum production.

The demand is keeping our plant busy night and day,—and we are the largest carburetor manufacturers in the world.

There is a real reason for Kingston popularity. It is the all-around efficiency of the Kingston Carburetor.

Used on automobiles, marine engines, tractors, motor cycles and for general gas engine work.

Byrne-Kingston & Co., Kokomo, Indiana, U. S. A.

New York: 1733 Broadway
Chicago, Ill.: 1430 Michigan Ave.
Detroit, Mich.: 870 Woodward Ave.
Boston, Mass.: 111 Haverhill St.
Los Angeles, Cal.: 334 W. Pico St.

Something to Think About!

MATERIALS of all kinds are very difficult to obtain nowadays, and buyers are busily searching out additional sources of supply in order to continue production without interruption.

No man can have too many strings to his bow; therefore we feel sure that in our organization buyers will find a valuable additional storehouse from which to draw their requirements.

In our Catalogs are listed complete lines of Equipment for every department of the ship and yacht building trades. We stock everything needed from the laying of the keel until the craft takes the water. Copies will be mailed for the asking.

CEO. B. CARPENTER & CO.

440 WELLS STREET - - CHICAGO, ILLINOIS

Contractors to U. S. Army and Navy

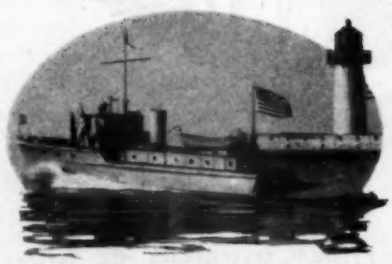
Miss Toledo 60 ft. x 11 ft. Patrol Type Express Cruiser Speed, 25 miles

The Dachel-Carter plant is 200 ft. x 72 ft. Equipped to build any type of boat up to 65 ft.

MISS TOLEDO—Our Latest Creation

We are proud of Miss Toledo. She is a Dachel-Carter creation—from stem to stern—from preliminary sketch and blueprint to the finished boat. Sixty feet in length and heavily constructed to insure safety and comfort in any sea, she makes 25 miles an hour—a remarkable speed for her size and weight.

Miss Toledo is a Patrol Type Express Cruiser, built for Mr. R. M. Ellery of Toledo, Ohio, and launched late in September. Now in Government service. Powered with two 8-cylinder 200 H.P. Van Blerck engines.



The practical speed and sea qualities of Miss Toledo, as well as the handsome finish and unusually comfortable living accommodations, provide an excellent example of Dachel-Carter skill in boat designing and building.

If you are interested in Express Cruisers, let us tell you more about Miss Toledo. We also specialize on fine mahogany finished runabouts, equipped for salt water service. It will pay you to get in touch with us before you order your new boat.

DACHEL-CARTER BOAT COMPANY Canal St., Benton Harbor, Mich.

Designers and Builders of High Grade Pleasure and Commercial Boats—Power, Sail or Auxiliary

"S. P. 102," FORMERLY "SHADOW III"

"Britton"—
the record-winning carburetor

When Shadow III ran for 10 miles around a 2½ mile circular course at the rate of 30.1 m.p.h. (Miami, Fla.-date) *she established a world's record for cruisers*—nothing could beat her. SHE WAS EQUIPPED WITH A BRITTON CARBURETER. Shadow III was presented to the Government by Mr. Carl B. Fisher and is now known as S. P. No. 102. Your boat is equipped with a good engine capable of speed and power. GET ALL THERE IS IN HER BY INSTALLING A BRITTON CARBURETER.

We can also supply other high grade marine carbureters for all classes of service, including the Famous Standard Model "E" Marvel Carbureter. Send for catalog.

MARVEL CARBURETER COMPANY - - Flint, Michigan

Some Real Sport for You This Winter

Here's the greatest Winter Sport you ever saw—a combination of the best features of motoring, motor boating, aeroplaning and ice yachting. And in spite of its hybrid character it is a thoroughbred which appeals to every sportsman who has red blood in his veins.

Speed, safety, comfort and thorough good fun are the winning qualities of the

AERO-SLED KING OF WINTER SPORTS
SPEEDS UP TO 50 MILES PER HOUR

The Aero-Sled is steered and controlled like an automobile. It has cushioned seats, auto steering wheel, hand brake and steel shod runners. In its design we have paid special attention to safety and comfort at high speeds. You can glide smoothly along at a rate of ten miles an hour and on smooth ice you can travel 50 miles an hour if you wish.

Can you imagine a more exhilarating sport?

This is the powerful little motor used on the Aero-Sled. It is the regular Aerothrust Outboard Marine Motor, one of the most popular rowboat motors on the market. It is a smooth, efficient, vibrationless engine, developing 3 H.P. and designed to operate at any speed from 250 to 1800 R.P.M.

Aerothrust

Two cylinder opposed, air cooled, with built-in-flywheel magneto. Fitted with 32 in. aero propeller. You can use the same engine on your rowboat in summer.

We also build a 5 H.P. Aerothrust motor.

Write today for full details and prices on the Aero-Sled and Aerothrust Motors. We can make immediate delivery on early orders.

AEROTHRUST ENGINE CO.

50 Madison Street - - - - La Porte, Ind.

DO YOU KNOW THAT BRUNS, KIMBALL & CO., Inc., have been selling guaranteed re-built engines for over 10 years?

DO YOU KNOW THAT BRUNS, KIMBALL & CO., Inc., have thousands of satisfied customers, many of whom are still using engines purchased from Bruns, Kimball & Co. in the first years of their business?

DO YOU REALIZE THAT BRUNS, KIMBALL & CO., Inc., could not stay in business if they did not give their customers satisfactory engines, and fair treatment?

DO YOU KNOW THAT BRUNS, KIMBALL & CO.'S 10 years of successful business is a guarantee to you of satisfaction, and fair treatment?

DO YOU KNOW THAT you can save nearly 50% by buying re-built engines of BRUNS, KIMBALL & CO., Inc.?

A list of over 200 honestly re-built engines will be mailed you free for the asking.

BRUNS, KIMBALL & CO., Inc.

115 Liberty Street - - New York City, N. Y.

Phone: 945 Cortlandt

Branch Store: Bourse Bldg., Philadelphia, Penn.

WRIGHT HEAVY DUTY ENGINES

High Grade Dependable Power Plants for Heavy Cruisers and Commercial Boats

Wright Heavy Duty Engines are power plants of the highest quality in design, materials and workmanship. We have spared no effort or expense in putting into them the quality of construction that insures the utmost reliability and durability in service.

They Operate Perfectly on Kerosene

We have devised a kerosene equipment that gives perfect service with less than half the fuel expense of a gasoline engine. There is no sacrifice in power, speed, flexibility or any other detail.

The Kerosene Is *Gasified*

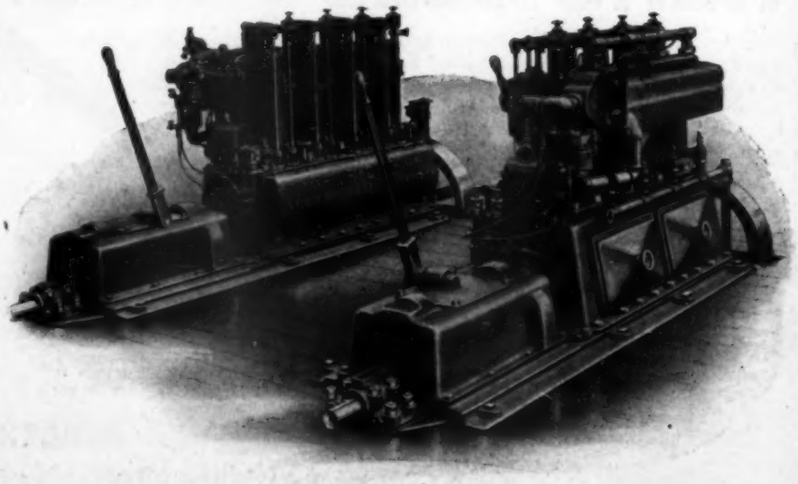
The Wright system converts the kerosene into a dry gas before it reaches the cylinders. It burns clean, free from carbon and lubricating troubles. No smoke or odor.

Valves in cylinder heads. Make and break ignition. Bosch Low Tension Magneto.

3-Cyl.	6 x 7½"	22-30 H.P.	4-Cyl.	7½ x 9"	45-60 H.P.
3-Cyl.	7½ x 9"	35-45 H.P.	6-Cyl.	6 x 7½"	45-65 H.P.
4-Cyl.	6 x 7½"	30-40 H.P.	6-Cyl.	7½ x 9"	70-90 H.P.

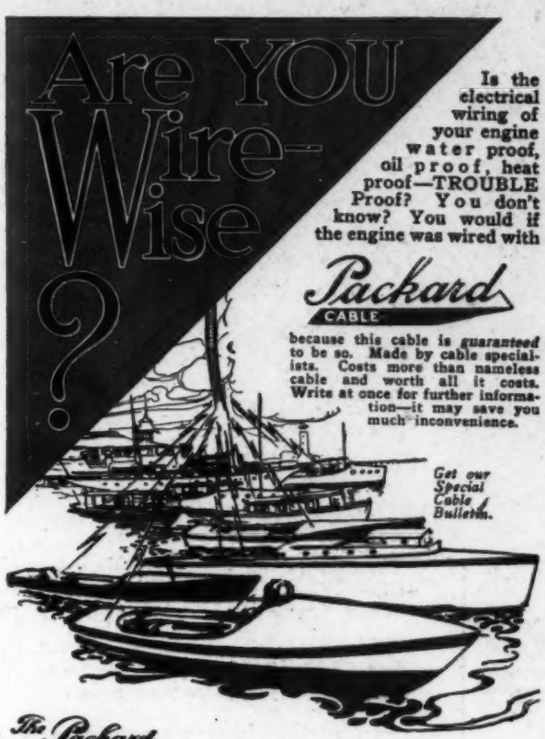
6 x 9" runs from 400 to 450 R. P. M.
7½ x 9" runs from 350 to 475 R. P. M.

Wright Twin Screw Outfit (right and left engines) equipped for using Kerosene fuel.



Full details furnished on request

WRIGHT MACHINE COMPANY
Owensboro Ky.


Are YOU Wire-Wise?
Is the electrical wiring of your engine water proof, oil proof, heat proof—TROUBLE Proof? You don't know? You would if the engine was wired with
Packard
CABLE
because this cable is guaranteed to be so. Made by cable specialists. Costs more than nameless cable and worth all it costs. Write at once for further information—it may save you much inconvenience.
Get our Special Cable Bulletin.
The Packard Electric Company
Warren, Ohio, U. S. A.

A 25-foot Runabout for $2,000

An Ideal Boat for Florida and the South

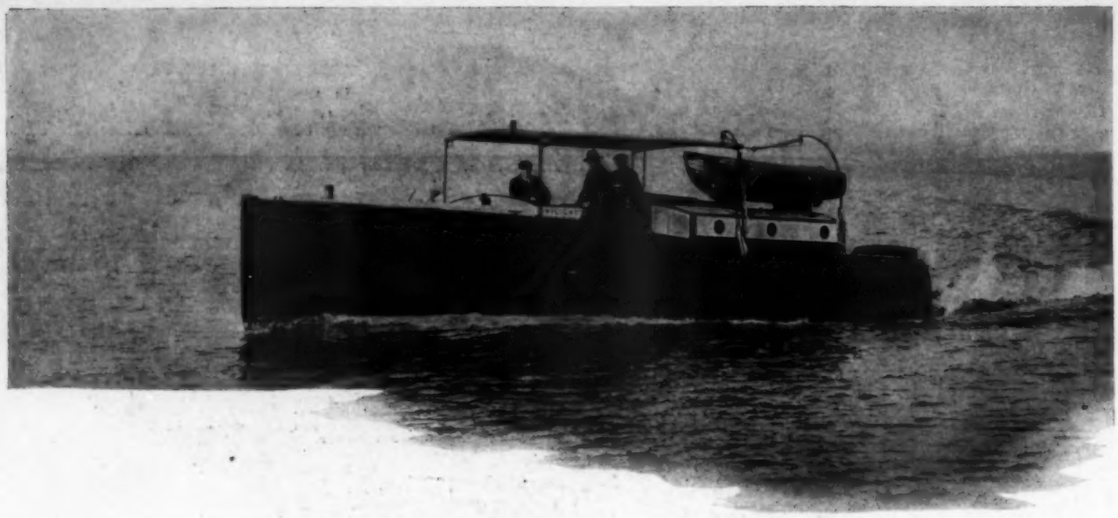
A TWENTY-FIVE FOOT standardized runabout guaranteed to make 20 miles an hour. That comfortably and luxuriously seats six people. Designed by and built under the supervision of America's foremost naval architect, John L. Hacker, N. A.

This boat is built to standardized specifications. It is delivered to you completely equipt and ready to run. Everything necessary for the continuous and efficient operation of the boat is included in the specifications.

It operates on the same principle and as easily as your automobile. Anybody able to operate a car can successfully and safely operate this 25-foot standardized runabout. The best obtainable materials and equipment are used throughout. It is a little dream boat you will take a great deal of pride in owning.

A number of these boats now going through the factory. Deliveries can be made promptly. A beautifully illustrated booklet has been prepared, this will be mailed to you with complete specifications immediately upon receipt of your request. WRITE TODAY. All orders filled strictly in order of receipt.

JOHN L. HACKER BOAT CO., 323 Crane Ave., Detroit, Mich.



MATTHEWS CRAFT

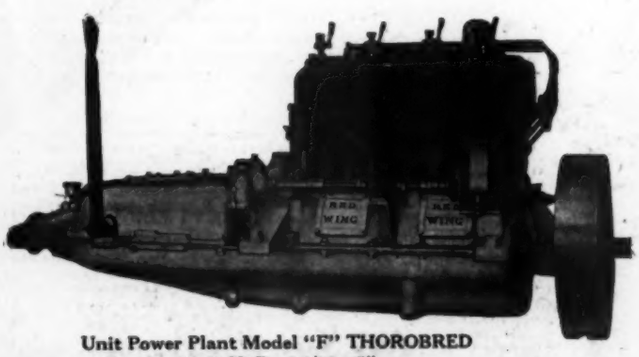
"QUALITY WITHOUT EXTRAVAGANCE"

TWILIGHT, 40 x 9 ft. cruiser, designed and built by the MATTHEWS BOAT CO. The power plant is a 75-horsepower Sterling. Speed 14 miles. Owner, Robert Jarecki of Erie, Pa.

TWILIGHT is a splendid small boat, fast, seaworthy and fitted for comfort. Matthews builds small boats as well as large ones. See a Matthews Craft before you place your order.

THE MATTHEWS BOAT COMPANY
MARINE RAILWAYS, STORAGE BASIN AND WORKS
PORT CLINTON - - - - OHIO

Red Wing Thorobred
THE MOTOR WITH POWER TO SPARE



Unit Power Plant Model "F" THOROBRED
28-36 H. P., 4 1/16 x 5"
Furnished with or without Unit Power Plant

Don't Save at the Spigot

In these days of conservation and economy, one should be more than ever impelled to apply the broad principles of thrift to every activity—and not the least to the purchase of his marine motor.

It saves you nothing to hold back a few dollars on first cost, then be compelled to spend ten times as much as you think you have saved in unnecessary repair bills, delays, fuel consumption.

The Red Wing THOROBRED has never disappointed anyone. It has astonished many. It is a motor that generously deserves to be investigated by men who want the utmost in satisfaction and service for their money. And the price is more than fair.

THOROBREDS are used throughout the world for work, pleasure and racing. Sizes 14 to 40 H.P., 4 cylinder 4 cycle. Kerosene or gasoline.

Drop a card while you think of it.

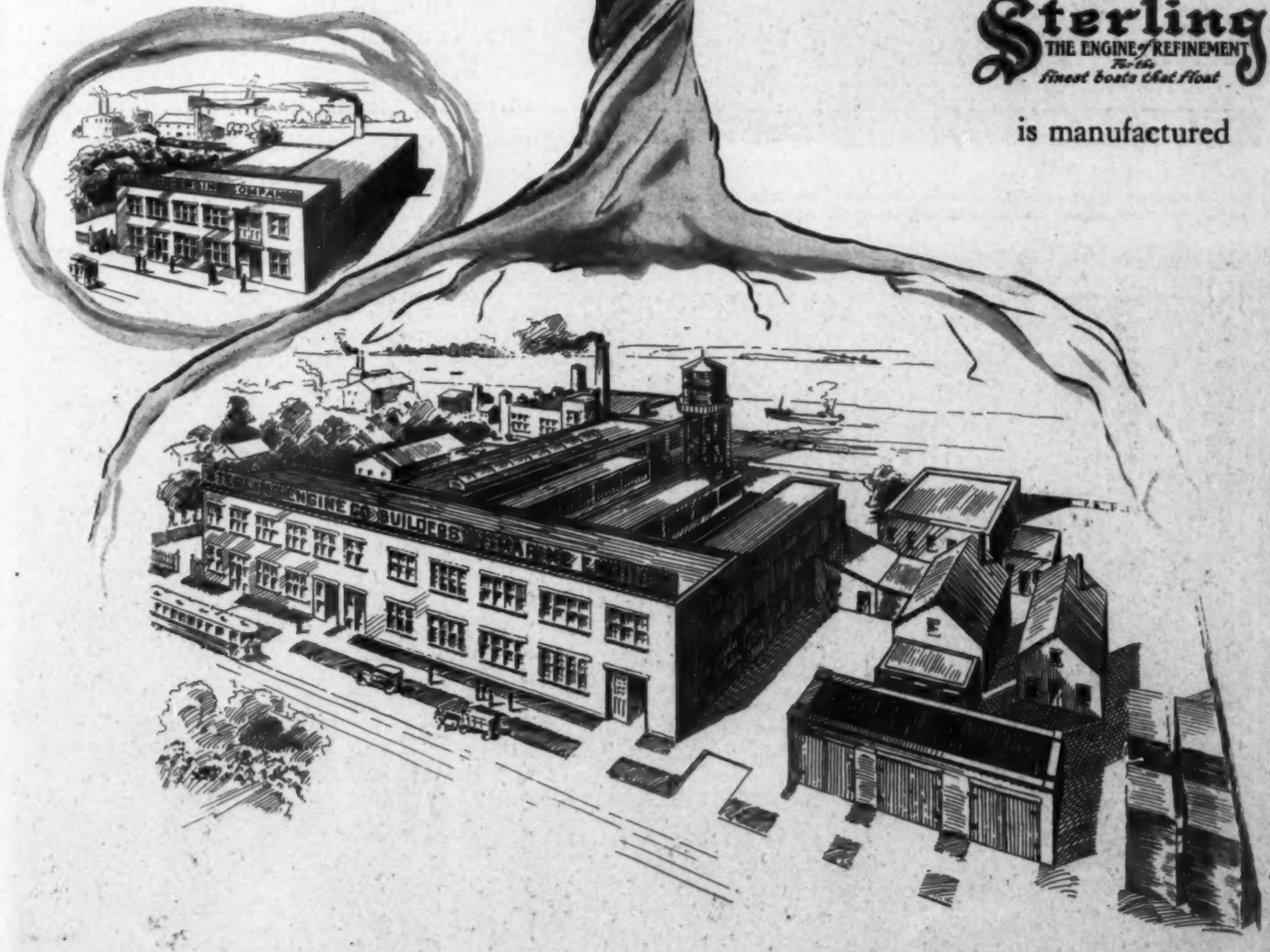
Red Wing Motor Company Department A Red Wing, Minn., U. S. A.

Growth

being a picture story of the past development and present achievement of the plant in which the

Sterling
THE ENGINE of REFINEMENT
For the finest boats that float

is manufactured



Sterling
THE ENGINE of REFINEMENT
For the finest boats that float

The reputation of the Sterling is so widely known, its position as the leading marine engine is so unassailable, that this advertisement is not about the Sterling engine but about the great plant in which it is manufactured.

Frequently when conducting visitors through the Sterling plant great surprise has been expressed, not only at the size and extent but also at its completeness and at the quality of the machines and equipment. As an example of the latest ideas in modern manufacturing efficiency it is comparable only to some of the newest of the big automobile factories.

This giant cutter machines the valve cap bosses, inlet and exhaust port flanges on eight cylinders at one time.

A fortune has been invested in machinery for manufacturing Sterling engines. Some of the machines have been designed and built to special order. Others are multiple process machines where a single operation takes the place of several operations with old-time machine equipment, saving time, cutting the cost and increasing the accuracy.

The first thought in equipping the Sterling plant has been to facilitate the maintenance of Sterling quality. The workmen have at their command every machine and tool that can help them. In fact we have tried to make our plant a machine which will operate automatically as smoothly and efficiently as the Sterling Engine itself.

Below is a portion of the Sterling machine shop, showing small parts machinery for gears, manifolds, reverse gear parts, etc.

Sterling

THE ENGINE OF REFINEMENT

For the finest boats that float

American manufacturing methods at their best are found in the Sterling plant. A fine machine like the Sterling Marine Engine, if built by earlier methods or with all the hand work which prevailed in European factories before the war simply could not compete in the American market on account of the excessive labor cost.

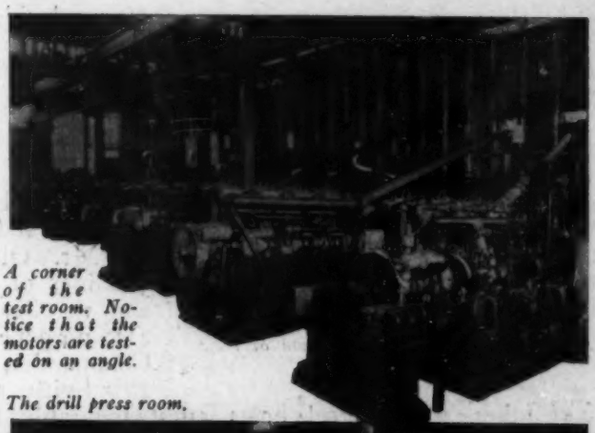
Our problem has been to maintain the accuracy of hand methods with the economy of machine production—and we have solved it. Although we have taken advantage of every advance in factory practice there are many points at which we could have taken short cuts had cost been the only consideration. But Sterling Quality must come first.

We do not boast of quantity production in the same sense as the larger automobile factories, but we do boast of *quality*. Our workmen are expert mechanics, trained to specialize. Constant inspection insures uniformity. Close limits are adhered to in each operation.

The Sterling Engine is *manufactured*, in the best sense of the word. It is a product of extreme quality, built under the most favorable factory conditions.

The Sterling Engine Company

1254 Niagara Street **Buffalo, New York**



A corner of the test room. Notice that the motors are tested on an angle.

The drill press room.

Below is the first step in assembly of Sterling F 8 motors. In one week these will be finished motors, running on the test block.

Sterling
THE ENGINE of REFINEMENT
For the finest boats that float

Scout, S.P.909, is "doing its bit" at 19½ miles per hour. Powered with twin Model FM 6-cylinder Sterling motors. Owned by Stanley Mortimer and L. Anson of New York.

The Sterling idea is to supply a high class power plant for every size and type of boat—the runabout and tender, the cruiser, racer, yacht, commercial boat and passenger boat. Not only do we build many different sizes but also different types, adapted for the various classes of work.

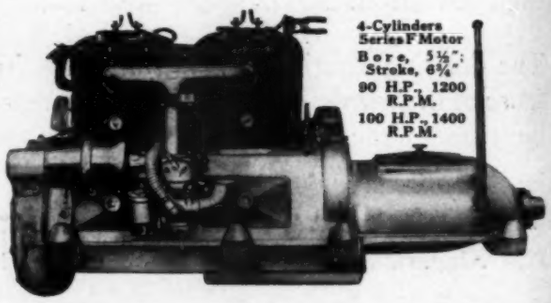
If you decide to buy a Sterling engine, you have a choice from a line so complete that there is never a question of our recommending an engine that is not quite the right size and type for your purpose.

Sterling Engines have powered more prominent big boats and broken more world's records than any other one make of engine. They have proven their stability in all types of boats, under every possible condition.

Not a few but hundreds of Sterling motors power patrol boats, navy launches, and barges. Such notable craft as the Whippet, S. P. 89, owned by Mr. Oliver Gould Jennings of New York, and the Susanne, S. P. 411, property of her Commander, Lieutenant Prindiville, and a legion of other scout patrol boats attest favorably to the performance of their Sterling motors. (Both Whippet and Susanne are on duty at Newport, R. I., and are among the largest gasoline propelled craft of their type at that port.)

The counterbalanced crankshaft is a feature of all Sterling Model F motors. It gives more even torque, reduces vibration to the minimum and increases the power and speed. Oil is forced through the drilled crankshaft to each bearing under pressure.

We extend a cordial invitation for you to visit the Sterling plant here in Buffalo at your first opportunity. We want you to see how Sterling engines are built and why they cost more than most marine engines although less than any other of equal quality. Visit our exhibit at the Motor Boat Show in January, or see our nearest dealer at once.



Waiting their turn on the test stands. Overhead trolleys move the finished motors into place, and carry the tested motors to the paint department.

Write today for latest illustrated catalog

The Sterling Engine Company

1254 Niagara Street **Buffalo, New York**

STANDARD

There is a good reason for the quality, reliability and value of the Standard Reverse Gears. Here in Detroit we have the pick of the best machinists and mechanics in the country. Men trained in America's most efficient manufacturing plants, trained to produce quantity without sacrificing quality, trained for accuracy and careful workmanship, trained in modern methods.

The Standard is manufactured in our new modern fireproof plant, which is completely equipped with up-to-date machines and tools. We have facilities which are denied to the small plant in a small town. No wonder we can build a gear of the highest quality at a price which makes it the best buy on the market.

There are considerably more than 25,000 Standard Reverse Gears giving satisfaction today. Their popularity forced us to increase our manufacturing capacity by 400% last spring. Study the Standard when you select your next gear.

Write for catalog and prices. Four sizes, 1 to 15 H.P. per 100 R.P.M.

LANGTRY MACHINE and TOOL COMPANY

700 Commonwealth Avenue **Detroit, Mich., U. S. A.**

REVERSE GEARS

VALLEY BOATS

This is "Sand Dab," a 16½ ft. shallow draft runabout that is a little wonder for a boat of its size. It will carry eight, go anywhere the water is a foot deep, and makes 12 miles an hour which is as exciting as a 30-mile speed in a large boat. Equipped with a 4 cyl., 4 cycle motor of 9-12 H.P. with reverse gear. Many duplicates of "Sand Dab" are now in service and we have several ready for quick delivery. Well built and handsomely finished.

Write for full specifications and prices.

Quality Boats from the First

Every boat builder likes to claim quality for his product, but usually this claim is merely a delicate way of explaining his high prices. Valley Boats are quality boats and they cost 10% to 40% less than others of equal quality. They are sturdy practical boats, built for real service and finished to please the most exacting owner.

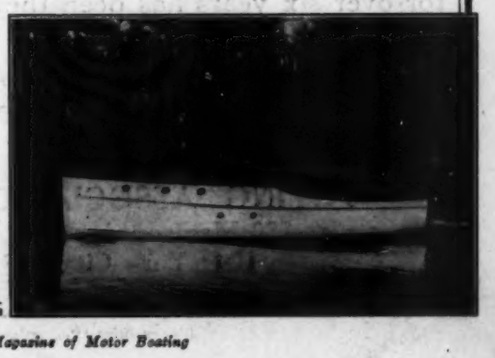
Long experience, complete building facilities and superior factory organization explain the exceptional value of Valley Boats. A comparison of quality and prices on anything up to a 40 ft. cruiser will verify everything we have said.

Let us quote on the type of boat you want. No obligation.

VALLEY BOAT CO., River Street Saginaw, Mich., U.S.A.

"My Ideal Runabout" at the left is 20' x 6' x 18" and seats up to 14 persons. Speed 16 miles per hour with a 20 H.P. Kermath motor.

The cruiser is "Regina," which we built for Dr. E. H. Lyon, of Englewood, N. J., and delivered to Miami, Fla., a few days ago. "Regina" is 36' x 10' x 2' and makes 12 miles an hour. 20-34 H.P. Scripps motor.



When you Advertise in—

Flying

Nearly $1,000,000,000 has been appropriated by the Government for aeronautics.

Over $1,000,000,000 private capital has been invested in aeronautical plants to manufacture dirigibles, aeroplanes, hydro-aeroplanes, aircraft parts, aeronautical instruments, hangars, motors, goggles, clothing and a hundred and one other different things necessary to this new industry.

Thousands of men and women are now employed in this new business. 110,000 men will be attached to the United States Aviation Corps.

Get in touch with this tremendous new Industry by reading FLYING, which for over six years has been the foremost aeronautical magazine published in America.

Twenty-five Cents a Copy
At All Newsstands

FLYING ASSOCIATION
280 Madison Avenue
New York City

Practical Navigation for the Motor Boatman

(*Continued from page 60*)

than two points, the vessel having been kept on one course between the taking of the bearings, and then look up in table 5A or 5B the difference between the course and each bearing. From the tables two numbers are obtained which when multiplied by the distance run between bearings give the distance to the light when the second bearing was taken and the distance it will be, or was, passed abeam. The two tables are alike in their functions, one being for mariners' points and the other for degrees. An example may make this clearer: A vessel was steering NE½E, when a light bore NNE the log read 26.7; the course was held until the light bore N½W when the log read 35.9; required the distance to the light. The difference between the course and the first bearing is two and a half points and the difference between the course and second baring, five points. These differences occur in table 5A on page 631, and two numbers obtained from that page are 1.00 and 0.83. 9.2 miles were run between the taking of the bearings so the vessel was 1.00 x 9.2=9.2 miles from the light when the departure was taken and will pass it abeam at a distance of 0.83 x 9.2=7.6 miles. All these methods of obtaining the distance to a fixed object which depend upon taking two bearings while maintaining the same course are no better than the method used for getting the distance run. If there is no current and a log is used, or the speed of the vessel accurately known, a good result can be obtained. If there is a big current of uncertain speed and direction, the method is of little value. Chapters XI and XXIV of Practical Motor Boat Handling give further methods of getting distances from a fixed object and these chapters should be read. The reader should clearly understand that the four-point bearing is by all odds the most useful of these various methods. Another method of locating a vessel when she is taking a departure is to locate her on the chart by cross bearings. This method is so well described in the chapter on piloting in Bowditch that it will not be described here.

As before the reader is advised to carefully go over everything said in Bowditch about the subjects taken up here and to those with mathematical training the concise mathematical explanations of processes in that book will appeal strongly. Next month the matter of finding the course and distance between two points by both middle latitude sailing and Mercator sailing will be taken up and the properties of the great circle discussed.

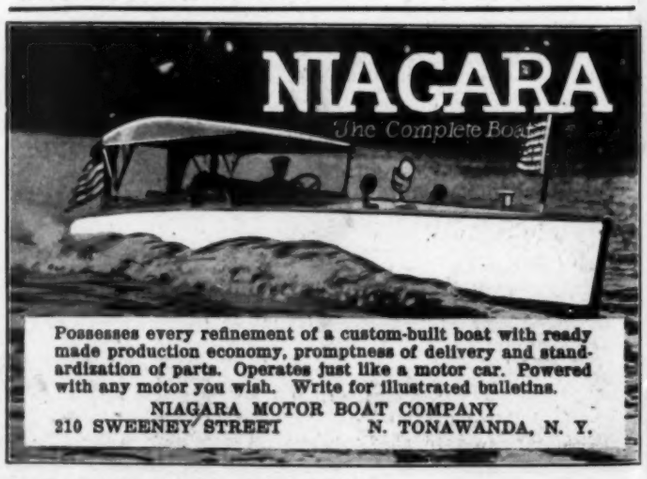
Why Some Motors Are Uneconomical

(*Continued from page 42*)

inch by means of air compressed to about 800 lbs. per square inch, while the Hvid engine admits the fuel by gravity during the suction stroke, into a small cup suspended in the combustion chamber, doing away entirely with all the complications of the air compressor and its attendant piping necessary to the Diesel engine.

While both types of engines get away from the complications and troubles of electrical ignition and the usual carbureter, the Diesel partly makes up for this by the addition of the air compressor and piping. There can be, therefore, no question as to which type has the fewest parts and least complications. Furthermore, it can easily be seen that Diesel engines cannot be built in small units on account of air compressor complications and the power necessary to compress air to 800 lbs.

Hvid's method of introducing the fuel into the combustion chamber is logically superior to the Diesel because the fuel is aspirated into a small steel cup which, after the engine has run a few revolutions, is maintained at a blue heat and tends to distill off the lighter hydrocarbons so that when the compression pressure, coming in through the small holes in the cup, reaches a point sufficient to ignite these lighter hydrocarbons, there takes place within the cup, a propagation of flame so rapid and intense as to resemble a detonation or explosion, which not only drives out into the combustion chamber, the heavier hydrocarbons, but tears them to pieces or atomizes them so that they are in the best possible shape for being burnt in the combustion chamber. In other words, from the instant the fuel leaves the metering needle-valve, it is in intimate contact with heat.



Possesses every refinement of a custom-built boat with ready made production economy, promptness of delivery and standardization of parts. Operates just like a motor car. Powered with any motor you wish. Write for illustrated bulletins.

NIAGARA MOTOR BOAT COMPANY
210 SWEENEY STREET N. TONAWANDA, N. Y.

the Genuine

More Power at Lower Cost

Here's a direct and immediate answer to two big questions uppermost in your mind.

How to get more power,—how to reduce fuel and oil consumption to meet the Government's appeal for conservation and also cut the cost of operation. It's found in

McQUAY-NORRIS LEAK-PROOF PISTON RINGS

They insure the development of the motor's full rated power at all times. Compression losses are impossible with properly fitted McQuay-Norris Piston Rings. No gas can escape on the power stroke. Oil wastage is prevented. Conservation and economy is the never-failing rule of their operation.

McQuay-Norris LEAK-PROOF Piston Rings were designed with an understanding of exactly what the piston ring function is—to exert and preserve absolutely equal pressure on the cylinder wall without any excess tension that would cause friction loss. No other make of piston ring reaches the perfection of the McQuay-Norris LEAK-PROOF in this respect—equals it in accuracy of workmanship, quality of material and length of efficient service.

Wherever you are—whenever you need new piston rings, you can get Genuine McQuay-Norris LEAK-PROOF in exact size for your motor—any make or model. Standard and oversize rings in all widths and diameters immediately procurable, ready for installation at once.

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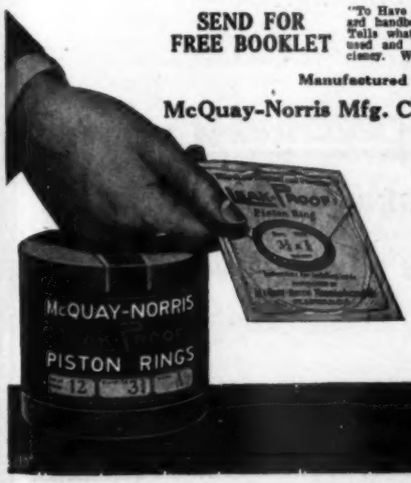
SEND FOR FREE BOOKLET

"To Have and to Hold Power"—the standard handbook on gas engine compression. Tells what piston rings are, why they're used and what they mean in motor efficiency. Write Dept. B.

Manufactured by

McQuay-Norris Mfg. Co., St. Louis, U.S.A.



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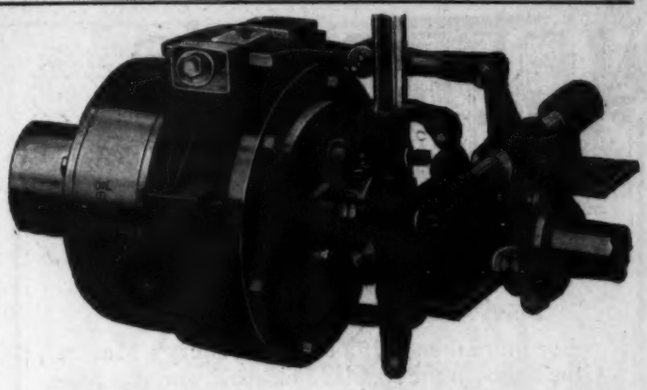

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The Navy Gear is the ONLY gear made today that carries the power forward entirely independent of all gearing, thereby eliminating all strain and preventing any crystallization of the gear teeth. Built by reverse gear specialists after more than ten years of the broadest experience in this line.

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H. C. Doman Co., Oshkosh, Wisconsin.
Driggs Ordnance Co., Inc., 120 Broadway, New York.
Duesenberg Motors Corp., Elizabeth, N. J.
Frisbie Motor Co., Middletown, Conn.
Gray Motor Co., Detroit, Michigan.
Mianus Motor Works, Stamford, Conn.
August Mietz Corp., 128 Mott St., New York.
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No matter what the size of your boat or engine, the Navy Gear will insure you the highest degree of reverse gear satisfaction. A trial will convince you.

Six Sizes—5 to 400 Horsepower

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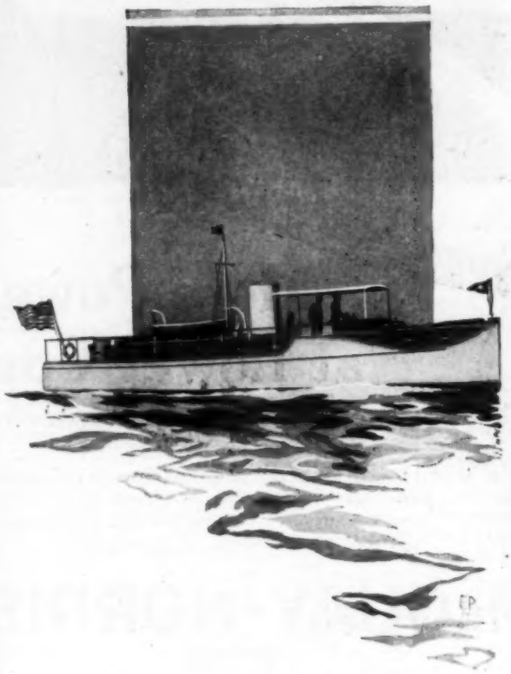

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You will find it a pleasant and profitable experience just to inspect it.

Possession assured in time for Southern cruising.

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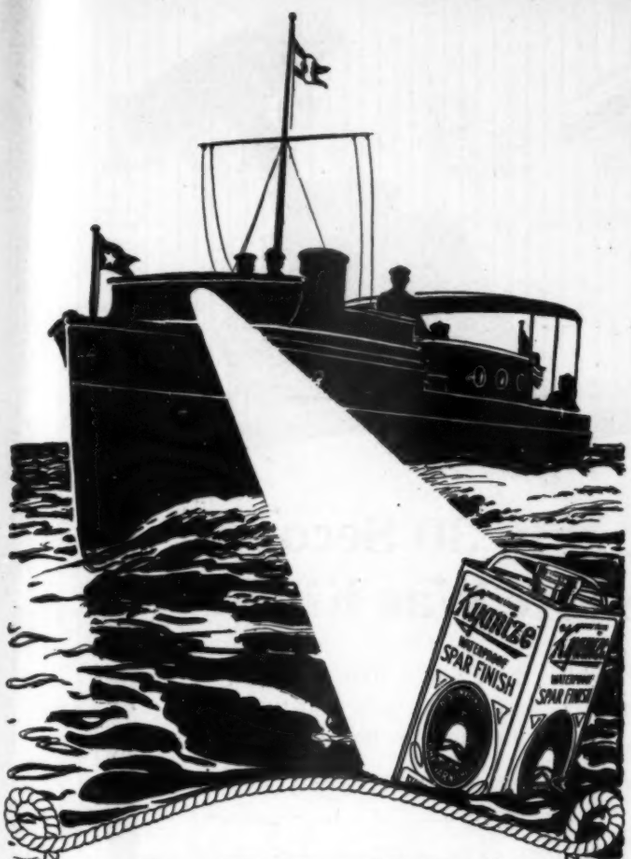

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You men who take pride in your boats—who want them shipshape all the time—will find in Kyanize Spar a master varnish that flows out beautifully from the brush. Hottest sun or coldest storm cannot cause Kyanize Spar to soften, crack or peel. It will not,—we guarantee it,—turn white under *salt or fresh water* —no matter how long it's submerged.

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Write for descriptive literature on Kyanize Spar Finish and Kyanize White Enamel, two Kyanize Products, especially adapted to the hard wear you motor-boat men demand. Each year shows a big increase among the yachtsmen who have learned to

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Insist on a Berling Magneto on your next motor.

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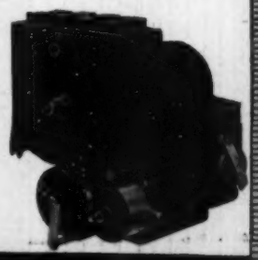
Berling Magneto



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"And in 30 Seconds The Fire Was Killed"

"—All of a sudden there was a flare and a flash! The flames rapidly crept dangerously near the gasoline tank. I had nothing to stop the burning oil from spreading.

"Fortunately the occupants of a nearby boat saw our critical situation. As they came alongside, the owner shot a stream from his

Fyr-Fyter

Fire Extinguisher

which he always carries in his boat. It was this wonderful little extinguisher that acted so effectively and saved our boat and possibly our lives.

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Here is something better than life insurance—a sure life saver that costs less than the average man's yearly life insurance premium. It is not an ordinary life-preserver but a sure life-*saver.*

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Whether you are cruising in your own motor boat or making an ocean voyage, you are constantly subject to the one great peril of the sea. But if you have an Ever-Warm Safety-Suit aboard you are as safe as you are on your own front porch. And, besides, you'll find the suit handy to have about your boat when you have to go overboard for repairs.

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This suit is a human thermos bottle. It keeps the cold out, and the bodily heat in. It floats a person so high that the head and shoulders are always a safe distance above the water. You cannot drown. You cannot chill—even in zero weather. Conscious or unconscious, you are protected until help arrives.

The Great Life Saving Invention of the Age

Ever-Warm Safety-Suits are beng carried by passengers on practically every transatlantic liner these days. They are protecting ambassadors, army officers, hospital units and business leaders. In use on the President's yacht "Mayflower" and other Government ships.

The Ever-Warm Safety-Suit gets its buoyancy not from air, but from a special composition which has five times the buoyancy of cork. It enables the wearer to *support at least five other persons.* The padding, or lining, will not absorb water—you will be kept afloat indefinitely, even if the suit be torn or cut.

A pocket is provided for carrying liquid food, also a whistle for attracting attention of rescuers. *The suit can be put on in less than a minute.*

Order your suit today. Give one to your soldier boy before he risks the perils of the submarine zone. The extraordinary demand is making prompt deliveries difficult in spite of our increased manufacturing facilities.

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The marine white that stays white longest. Easy to apply, easy to clean (can be scrubbed with soap), withstands salt water and hard knocks, leaves a perfect surface for repainting. Full bodied, spreads well, dries quickly. An all-season white that eliminates mid-season hauling out.

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An oil-proof, heat-proof, high gloss finish that will keep your engine ship-shape and prevent the ravages of rust. Made in six rich colors. Easy to apply, hard to chip off. Will make your engine compartment the "show-place" of your boat.

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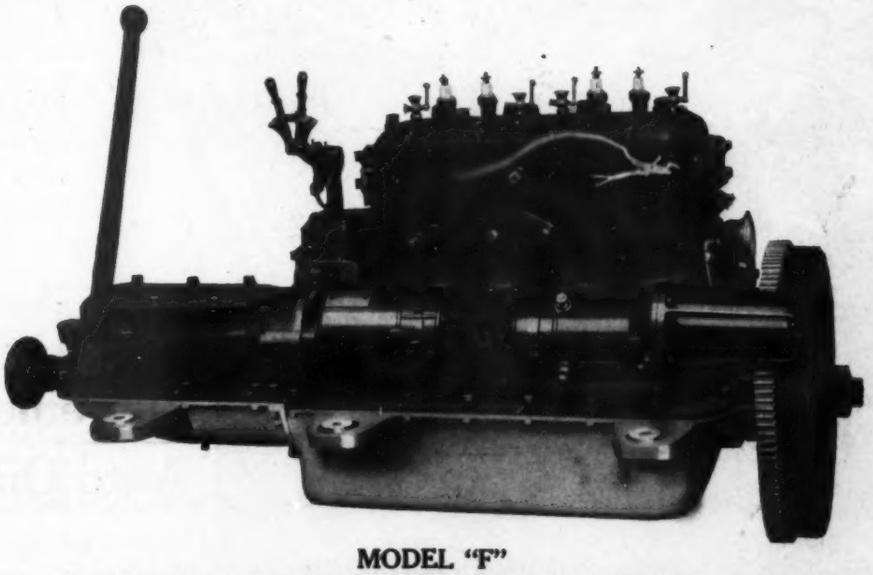
Largest Builders of Small Marine Motors in the World

High Quality at the Right Price and square dealing did it



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4 cylinder 3 x 4, Self Starting, Unit Plant—quiet, clean, powerful, force feed lubrication (through crank shaft)—Big Bearing, etc.

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Two and Four Cycle Marine Motors—3 to 40 h. p. $74 and upwards. Send for Big Catalog

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"Short turns at Top Speed"

THAT GOOD GULF GASOLINE is a clean, powerful gasoline, manufactured especially for the gasoline motor, from selected high-grade crude petroleum under the strict supervision of the most skilled chemists.

It is straight run, containing no kerosene or casing head mixtures, and carefully filtered for the elimination of any foreign matter.

It is used by the United States Navy in its submarines and all other gasoline-propelled craft. This, in itself, is the best evidence of its superior quality.

GULF REFINING COMPANY

Supreme Auto Oil

Leaves less carbon, as it contains no paraffine gum to collect and hold the free carbon.

Use Gasoline or Kerosene in a

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The Motor of Renown

A Common-Sense Motor at a Common-Sense Price

The whole policy back of Miller Motors is explained by that one sentence, "A common-sense motor at a common-sense price." It means more than you realize at the first reading. Think it over.

Every boat owner wants a thoroughly good motor. But only one in a hundred wants the fancy features and frills that are making the best known motors almost prohibitive in price. Honest materials, honest workmanship, honest design—these are the essentials. But it is the luxuries—the unessentials—that are so costly.

For top-notch value at rock-bottom price, investigate Miller Motors. They are neither high priced motors nor cheap motors, but the happy medium that insures the greatest return for the money invested. Every essential for good service—economy, power and dependability—is built into them.

Miller Motors have been manufactured for almost 15 years. There are hundreds in use. They have reached to every part of the world. They are giving satisfactory service in all sizes and types of boats, in both pleasure and commercial use.

You don't take any chance when you buy a Miller Motor. The efficiency of every model we build has been proved in actual service.

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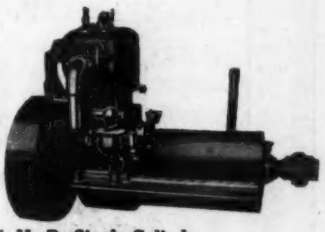
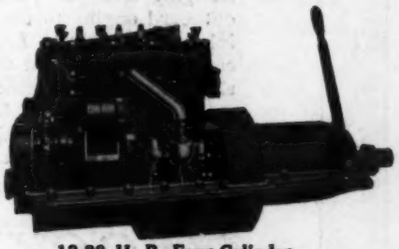
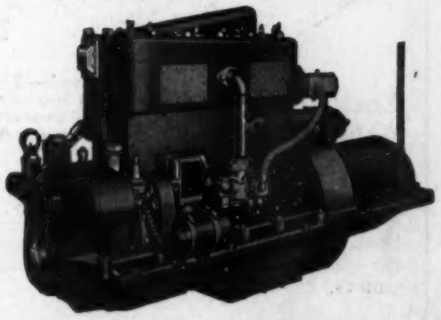


4 H. P. Single-Cylinder Miller Model F Motor.



12-20 H. P. Four-Cylinder Miller Model E Motor.



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Bristling with valuable suggestions and interesting information this book contains the very essence of what you must know to buy your boat engine intelligently.

The book describes and pictures the complete line of *L-A* engines for launches, cruisers, work-boats, etc. It gives you comprehensive knowledge of the size and power of engine for your boat. And it offers timely advice to aid you in your selection.

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Inboard and Outboard — ***2 & 4 Cycle—2 to 20 H.P.***

There's an *L-A* Engine for every size boat.

Ranging from the portable 1 cylinder, 2 h.p. outboard engine to the big 4 cylinder, 20 h.p. inboard motor, the *L-A* line is complete and embodies throughout the same fine workmanship and skillful engineering.

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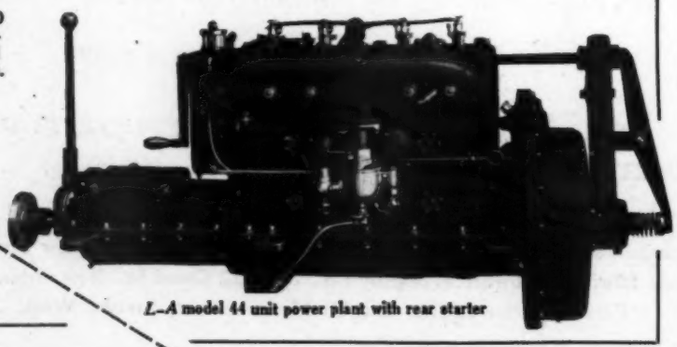

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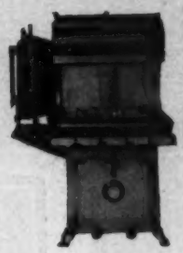
Alcohol Stove with Tank

Inside Portlight

Full Line of Compasses

Durkee Pattern Portlight



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We also embrace this opportunity to wish our many friends

THE COMPLIMENTS of the SEASON

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We hope to be entrusted with your favors in 1918, and can assure you that every care will be taken to execute orders so as to give the fullest satisfaction.

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Kay Log

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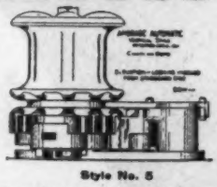

Style No. 5
To handle two chains and two ropes
Andrade Windlass

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HYDE

TURBINE TYPE PROPELLERS
are used by the
WORLD'S FASTEST BOATS

While there are many minor trophies, the greatest and most desirable speed boat trophy in the world is indisputably the famous Gold Challenge Cup. Raced for by the fastest boats in the world, its possession brings the utmost distinction that a motor boat club can secure. This famous trophy has been won four consecutive years by boats equipped with

HYDE TURBINE TYPE PROPELLERS

as follows:

1914—Baby Speed Demon II
1915—Miss Detroit
1916—Miss Minneapolis
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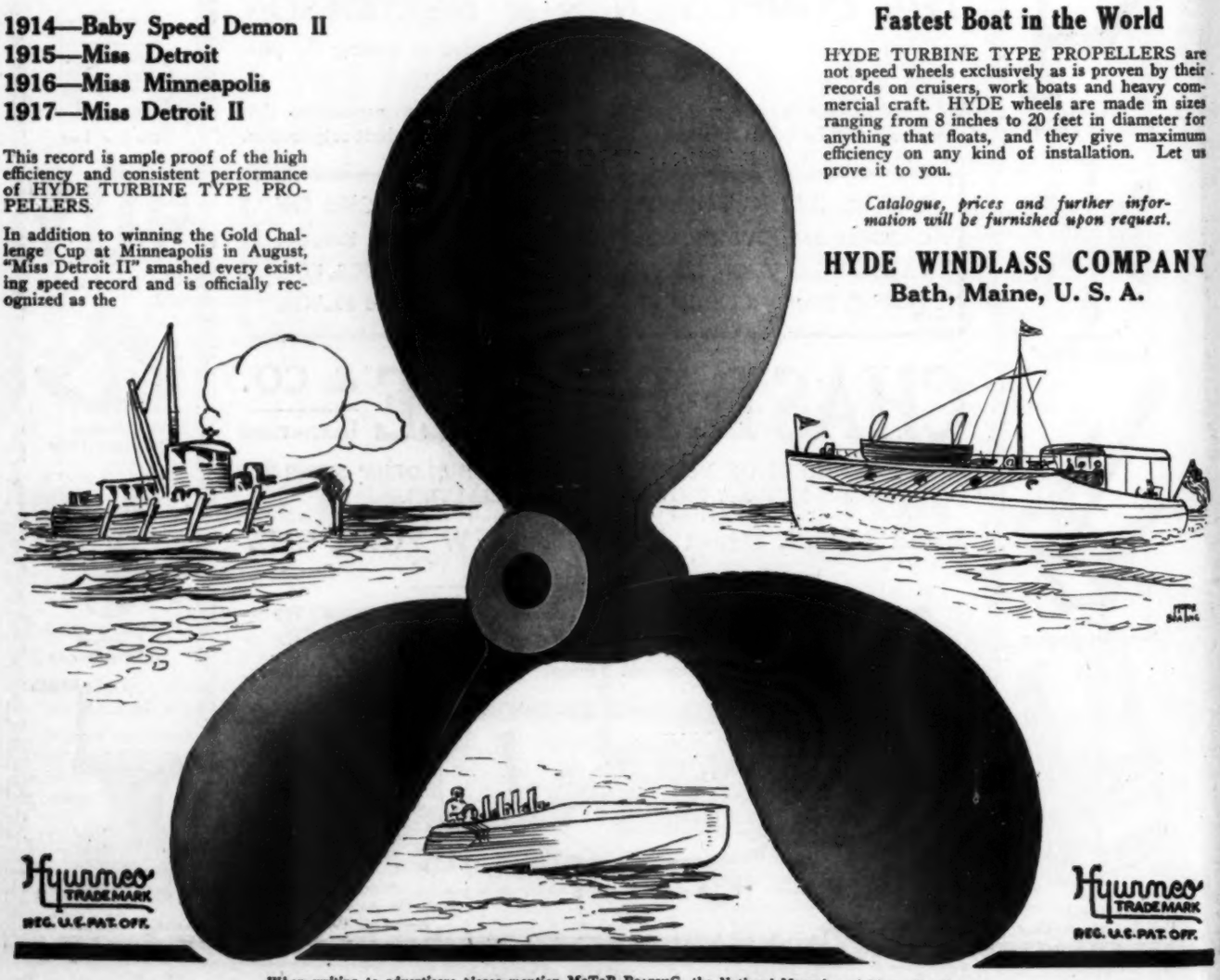
This record is ample proof of the high efficiency and consistent performance of HYDE TURBINE TYPE PROPELLERS.

In addition to winning the Gold Challenge Cup at Minneapolis in August, "Miss Detroit II" smashed every existing speed record and is officially recognized as the



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HYDE TURBINE TYPE PROPELLERS are not speed wheels exclusively as is proven by their records on cruisers, work boats and heavy commercial craft. HYDE wheels are made in sizes ranging from 8 inches to 20 feet in diameter for anything that floats, and they give maximum efficiency on any kind of installation. Let us prove it to you.

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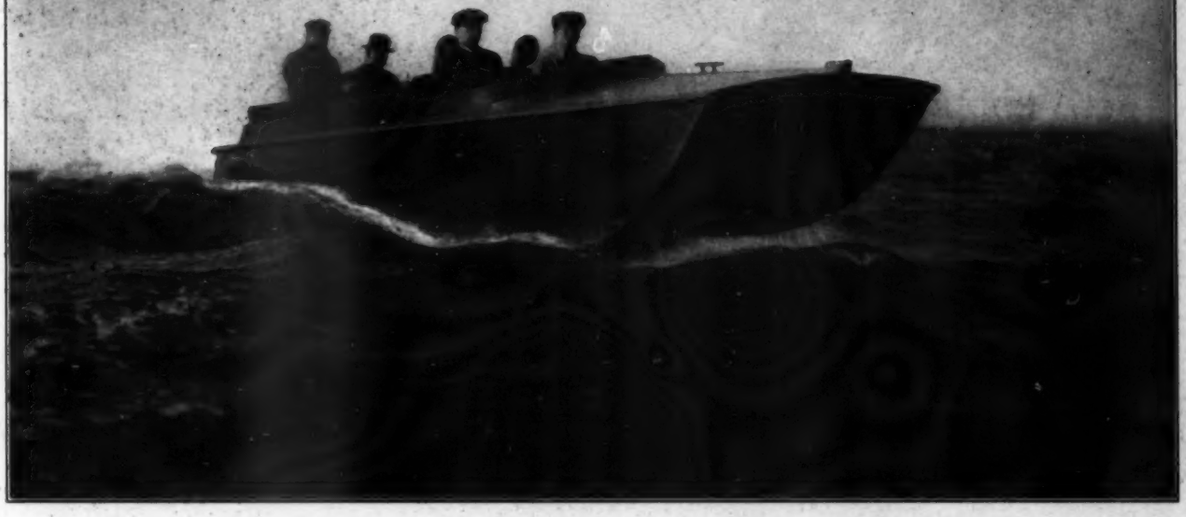

Above is the first little 20-footer that went to the New York Show.
Below is part of a larger Sea Sled.

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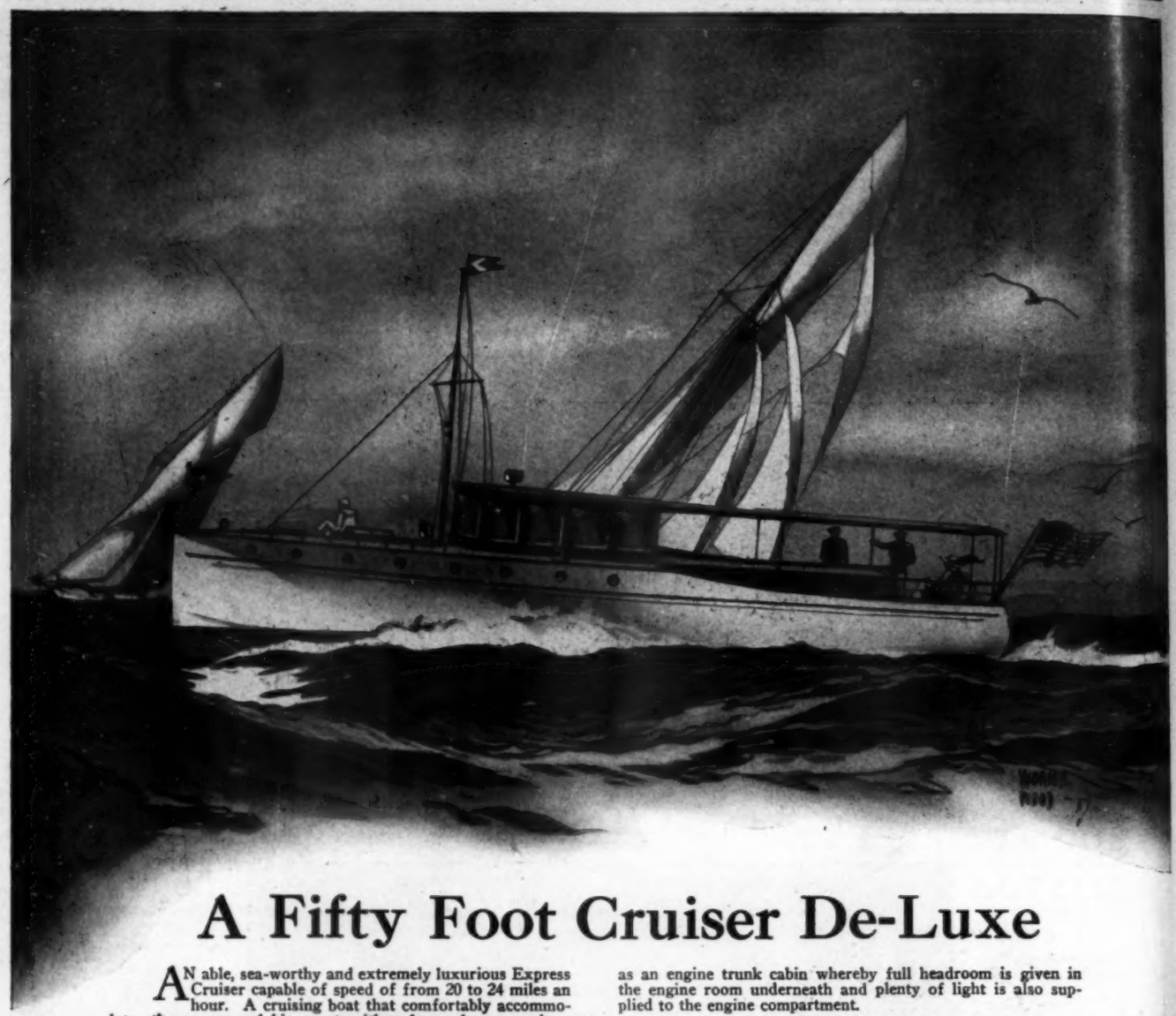
Pictou, Nova Scotia,
Canada.



A Fifty Foot Cruiser De-Luxe

AN able, sea-worthy and extremely luxurious Express Cruiser capable of speed of from 20 to 24 miles an hour. A cruising boat that comfortably accommodates the owner and his guests either for a day, a week, a month or as long as required. Every detail of equipment, every attention has been given to so designing and building this boat that every convenience possible to incorporate in a boat is to be found in this one.

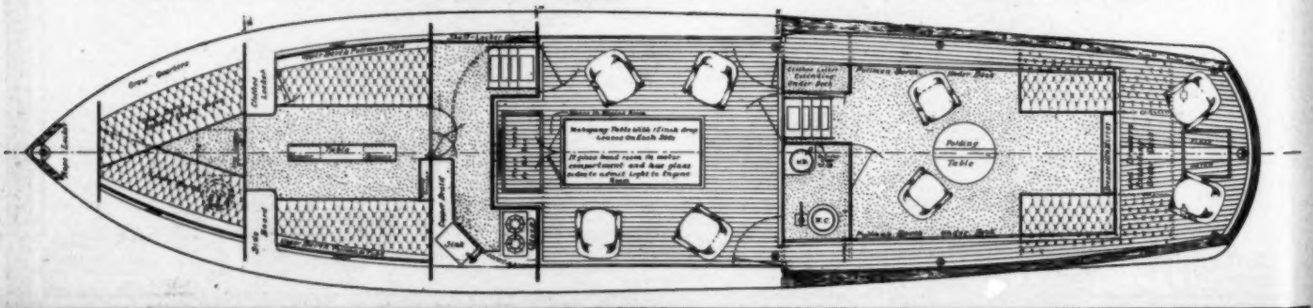
The design itself represents the very latest thought and trend in the designing and building of the modern Express Cruiser. By referring to the arrangement plan below it will be seen that a crew of two is comfortably accommodated in the bow of the boat. Next follows a big roomy stateroom that accommodates two or four people by night and is converted into a dining saloon during the day if necessary, although most of the meals will undoubtedly be served in the rather wonderful glass-enclosed deck house situated amidships. This deck house represents a big advance in design of boats of this type. It is completely enclosed in glass, which detracts not a bit from the sight-seeing efficiency but materially adds to the general comfort. This deck house can be opened up as much or as little as may be desired. In the middle of this deck house is located a permanent table which also serves as an engine trunk cabin whereby full headroom is given in the engine room underneath and plenty of light is also supplied to the engine compartment.

Immediately forward of the deck house is located the large and fully equipt galley efficiently segregated from the rest of the boat, yet readily accessible. Much thought has been given to the design and equipment of this galley and it undoubtedly represents a big advance in detail, as this part of the boat must be efficient to make cruising in this boat the wonderful pleasure and recreation it is.

Aft of the deck house is the owner's stateroom, a great, big, luxuriously furnished room with equipment and conveniences only to be found in the best of hotels and private homes. The aft deck is a very comfortable lounging place.

This Fifty Foot Cruiser is built to definite standardized specifications, a copy of which will gladly be mailed upon request. This boat, fully equipt in every respect and powered with a pair of six cylinder Van Blerck motors sells at $19,000.00 F. O. B. Factory and when equipt with a pair of eight cylinder Van Blercks, sells at $21,500.00 F. O. B. Factory. Write to-day for your copy of the specifications and full details as to equipment and delivery. Ask for design No. 547.

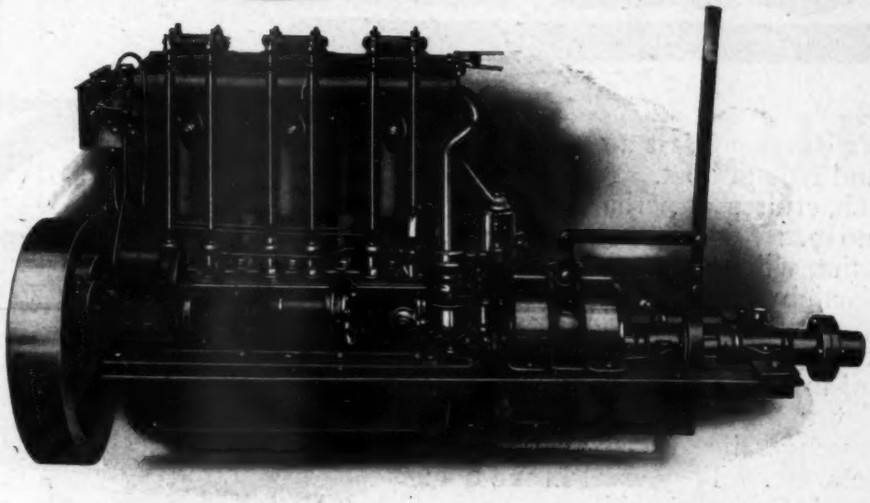
ALBANY BOAT CORPORATION - WATERVLIET, N. Y.



Forging Steadily Ahead for Ten Prosperous Years

Frisbie VALVE-IN-HEAD MOTOR

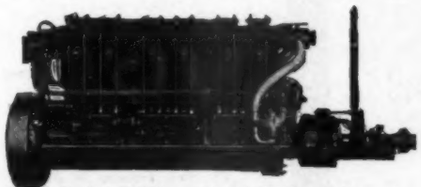
IN THE FIRST issue of Motor Boating, ten years ago, the Frisbie Motor was advertised. The company had been incorporated in 1907 and the motor then was basically the same as the Frisbie Motor of today. We are proud of the fact that so little change has been found necessary in the original Frisbie four-cycle valve-in-head design.



Three-Cylinder Frisbie. 18-25 H. P. 6 in. x 6 in. Speed 400-550 R. P. M. Weight with reverse gear, 1050 lbs. Length with reverse gear, 66¾ in.

MANY IMPROVEMENTS and refinements have been added, keeping pace with the general advance in marine engineering practice. But we doubt whether any other pioneer marine engine builder could show the same consistent adherence to original principles, proving that the original Frisbie design was correct.

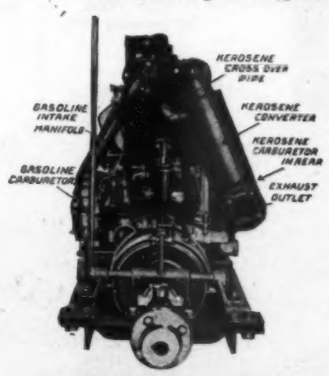
THE FRISBIE MOTOR has prospered in the past decade. It has penetrated to nearly every part of the world, and has won an enviable place for itself in the affections of its owners. It has won races and established records, but we consider much more important the reputation it has earned for unmatched dependability.



Six-Cylinder Frisbie. 50-75 H. P. 6 in. x 6 in. Speed 550-800 R. P. M. Weight, engine and reverse gear, 1600 lbs. Length over all with reverse gear 88½ in.

AS A MATTER OF history this may not interest you. But as a future engine buyer, you must consider the progress of the Frisbie. You must study the facts. For back of our conservative statements you will find a record of service that is just what you want in the engine you buy.

TEN YEARS IS almost a lifetime in the marine industry. But it is still far below the lifetime of a Frisbie Motor. We know where many of the earliest Frisbies are still running. We are expecting our engines of today to be still in the prime of life ten years from now. A Frisbie Motor is a permanent investment, intended to last as long as the boat in which it is installed.



FRISBIE KEROSENE MOTOR
Three-Cylinder, 18-25 H. P., 6 x 6 inch bore and stroke. End view of Frisbie Kerosene Motor, showing the separate manifolds and carburetors on opposite sides.

EVERY FRISBIE MOTOR has been a valve-in-head motor. This type has always been conceded an advantage of 20% greater efficiency and fuel economy. Practically all racing engines and aviation engines are valve-in-head. Frankly it is a design that costs more to build—but the advantages more than justify the added cost.

FRISBIE MOTORS can be supplied to burn kerosene as well as gasolene. The kerosene equipment is a thoroughly perfected device which gives just as reliable and satisfactory service as a gasolene motor at less than half the cost. A Frisbie Kerosene motor has driven the machinery in our plant for several years.

GET ACQUAINTED with the Frisbie, the "Friendly Motor." Let us tell you exactly what it is doing in other boats similar to yours.

Write today for latest catalog and prices

One to six cylinders Three to seventy-five horsepower

The Frisbie Motor Company

7 College Street **Middletown, Conn.**

For YOUR boat

JOE'S REVERSE GEAR

WE build Joe's Reverse Gears and Clutches for every size and type of boat. You may have a hydroplane, launch, cruiser, or perhaps a big tug or heavy freighter; no matter which you have, we build the clutch that will give you the most service and satisfaction for your money.

Joe's Gears are known the world over. They are used in record breaking speed boats like Miss Detroit (shown below), Miss Minneapolis, and in passenger boats, commercial boats, auxiliaries, cruisers, etc. They excel in the qualities that make a good gear worth while.

Joe's Duplex Drive is the only heavy duty gear with nearly the same speed ahead and astern that does not depend on locked gear teeth for forward drive.

Write today for latest catalog. It contains valuable information you should have before you select any gear, clutch, or starter. It is free.

MEMBER

Extensively used by United States and Allies.

The Snow & Petrelli Mfg. Co.

154 Brewery Street **New Haven, Conn.**

JOE'S DUPLEX DRIVE HEAVY DUTY REVERSE GEARS.
For Heavy Boats and Racing Craft.

JOE'S FAMOUS HIGH POWER GEARS.
For High and Medium Speed.

JOE'S HIGH SPEED ONE-WAY CLUTCHES.
Especially for Hydroplanes and High Speed Propositions; Smallest Size Transmits 30 H. P. at 1,000 R. P. M.

JOE'S REGULAR ONE-WAY CLUTCHES.
A high class, low priced clutch for general uses.

JOE'S SAFETY Rear Starters

A genuine safety device and a sure protection against kick back. Mounted either on adjustable frame or bulkhead bracket, and may be attached at either end of the motor. Saves labor, money and injury. Price reasonable.

AGENTS: J. King & Co., 10 Church Row, Limehouse, E. London, Eng.; L. H. Coolidge Co., Seattle, Wash.; W. C. Disbrow, Jr., 71 Cortlandt St., New York; A. G. Hebgen, 436 Market St., San Francisco, Cal.; Wood Vallance & Loggat, Vancouver, B. C.; A. R. Williams Machinery Co., Toronto.

"Miss Detroit." Powered with a high-speed Sterling motor. Equipped with a Joe's Duplex Drive Gear.

YOU CANNOT BEAT THE GOVERNMENT

The Government has demanded so many

COLUMBIAN QUALITY PROPELLERS

That we were obliged to enlarge our plant to satisfy them.

With all the manufacturers in the World to choose from, the American, British, French, Russian and Italian Governments have chosen Columbian Quality propellers for more than

1000 SUBMARINE CHASERS AND PATROL BOATS

It is impossible for you to do better than the Government.

Write for Propeller Treatise,
"PROPELLERS IN A NUT SHELL."

WE ALSO MAKE RUDDERS, STRUTS AND EVERYTHING MARINE IN CAST BRONZE.

COLUMBIAN BRONZE CORP.

218 North Main Street

FREEPORT, LONG ISLAND, NEW YORK

New York Branch for local city sales only, Concourse, 50 Church Street

"Auto

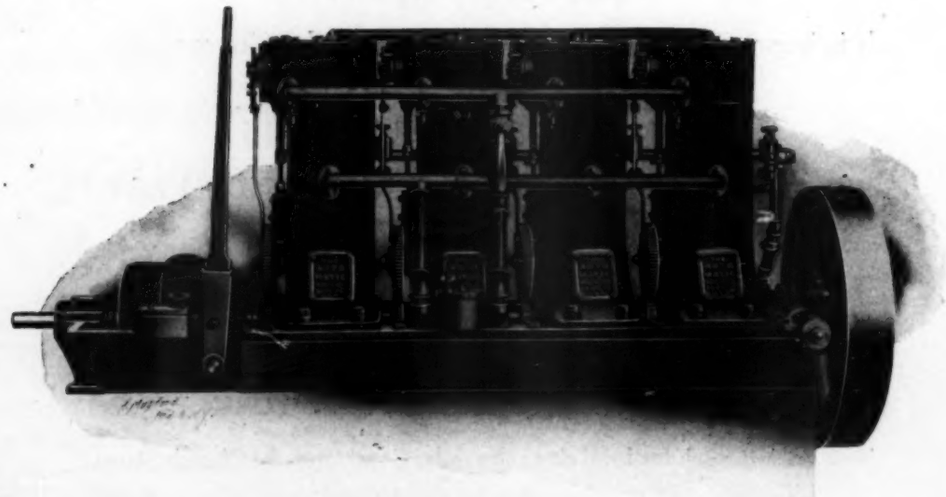
2 to 6 Cylinder Models

Back in those pioneer days when the first Motorboats were appearing Automatic motors were marvels of their time.

As the years have passed Automatic motors have steadily maintained their leadership for distinctive *Simplicity, Strength and Durability.*

Today in the Automatic latest model the particular boatmen are offered a motor that is acknowledged more simple in design yet supremely Powerful and Durable in construction.

1902 MODEL



THE AUTOMATIC MACHINE COMPANY

...matic"

3 to 350 Horsepower

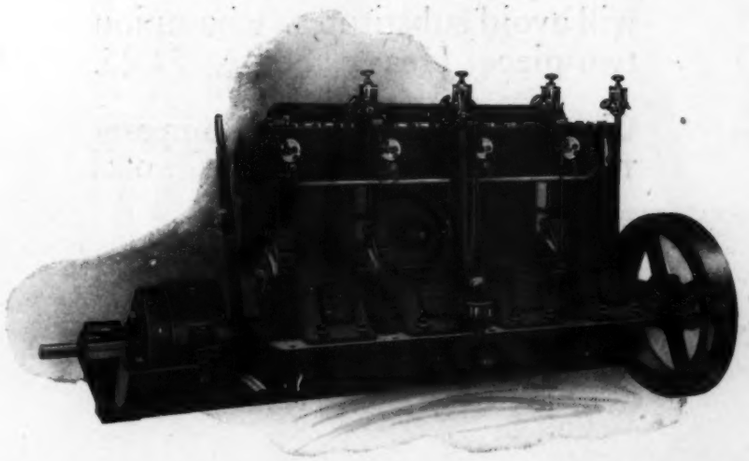
Possessing rare originality of Design, the latest model Automatic instinctively appeals to one's pride of ownership.

And in performance The Automatic never belies its appearance.

Buy an Automatic and enjoy motorboating the right way. You can pay more but you can't get any better engine. There's an Automatic suitable for your boat unless you have a speed boat.

Write for catalog, and if you would like to have us suggest size Automatic to consider using, advise in your request dimensions and type of boat, speed desired, and for what purpose it is used.

1910 MODEL



BRIDGEPORT, CONN., U. S. A.

Champion Toledo

Dependable Spark Plugs

Make sure of the best results from your boat by getting the spark plugs with the name Champion *on the porcelain.* This will avoid substitutes. Champion two-piece Heavy Stone, $1.25.

Champion Spark Plug Company
Toledo **Ohio**

Medium Size Medium Speed Medium Heavy Duty —but Such Power!

The Model D-4 Gray & Prior Four Cycle Motor is a wonder for velvety power and great endurance. It is built for hard work in heavy cruisers and commercial boats from thirty-five to seventy-five feet in length. In such boats the requirements of steady service call for a motor of unquestioned reliability.

This is a genuinely high grade motor. The power rating is conservative. The parts are larger than necessary, giving an ample margin of safety for every strain. Many parts are case hardened or heat treated alloy steel. Nothing has been spared to give the D-4 every advantage of good design, good materials and good workmanship.

Write today for Catalog "D."

SPECIFICATIONS

CYLINDERS—L-head, with detachable heads. Bore, 4½". Stroke, 6".

CRANK CASE—Large removable side plates in each side of upper half for convenience and accessibility. Sight glasses cover the hand holes, permitting observations while motor is in operation.

CRANK SHAFT—40-point carbon steel, heat treated and ground to exact size. Main bearings 2¼" in diameter. End bearings 5" long. Much larger and stronger than usual in a motor of this size.

CAM SHAFT—Runs in a bath of oil. Entire cam shaft assembly can be removed as a unit without dismantling the motor.

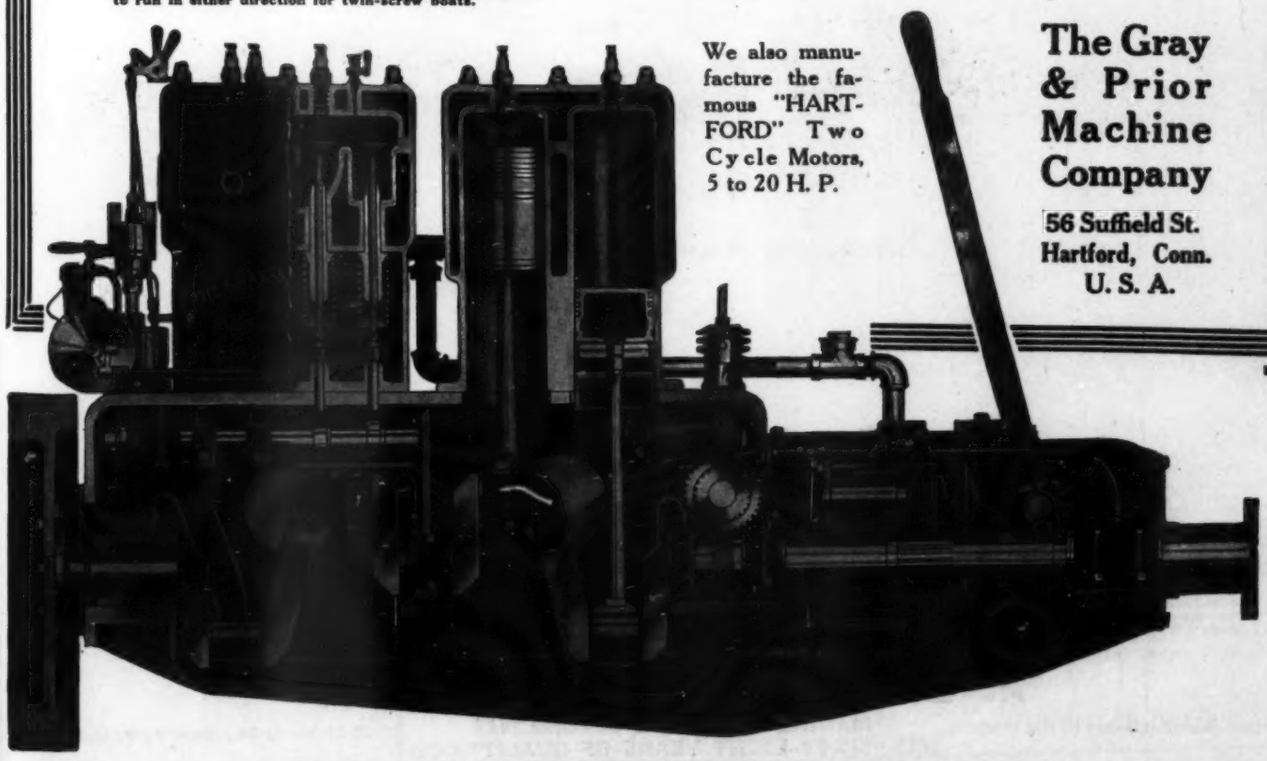
IGNITION—Two complete independent systems. High tension gear-driven magneto, also battery with Connecticut coil and distributor. Separate set of spark plugs for each system.

LUBRICATION—Pressure feed to all working parts and bearings, including reverse gear.

REVERSE GEAR—Planetary spur gear type with multiple disc clutch, large and easily adjusted. All gears and pinions made from alloy steel, heat treated and hardened. Same propeller speed on reverse as forward.

AIR COMPRESSOR and bilge pump built in on motor.

All motors are supplied with bronze fittings whether for salt water or fresh water service. Can be furnished to run in either direction for twin-screw boats.



We also manufacture the famous "HARTFORD" Two Cycle Motors, 5 to 20 H. P.

The Gray & Prior Machine Company

56 Suffield St.
Hartford, Conn.
U. S. A.

"SANDS" MARINE SANITARY FIXTURES

Four of the best Fixtures ever produced for the price. "Sands" Quality in each

A serviceable extra strong pump closet for owners and crews quarters

THE "FRISCO," PLATE S-2046.
(Design Patented—Copyrighted.)

The "FRISCO" Pump Water Closet, with special extra heavy Vitro-Adamant oval hopper bowl. Improved non-corrosive composition, **THREE** (3) **INCH** combined supply and waste pump. "Sands" Special composition waste arm with check valve. "Sands" Patent Automatic Safety Water Supply Foot Valve. "Sands" Patent Back-Water Discharge Valve. All metal parts smoothed except the detachable metal handle with wood grip which is nickel-plated. Made extra strong and serviceable in different finishes for owners and crews quarters.

Pump rough with all metal parts rough bronze finish, oak seat only, no cover $62.50
Pump rough with polished brass trimmings, oak seat only, no cover 70.00
Pump white enameled with nickel plated trimmings, oak seat only, no cover 75.00

If fixture is wanted with oak seat and cover, add $1.00.

Dimensions: Width 24 inches, front to back 21 inches, height 17½ inches.

Weight: Approximate—Net, 80 lbs. Shipping, 150 lbs.

"KNOCKABOUT" PLATE S-34. (Patented.)

The Old "RELIABLE KNOCK-ABOUT." Fitted with "Sands" Automatic Safety Supply Foot Valve and "Sands" Patent Backwater Check Valve. Vitro-adamant round flushing rim hopper bowl, oak or mahogany seat and cover with rubber bumpers and heavy nickel plated brass post hinges.

Pump rough, finished trimmings, oak seat and cover..... $52.50
Pump finished white enamel, nickel plated trimmings..... 57.50
Pump polished and nickel plated all over 62.50
If with mahogany seat and cover, add 1.50

For over thirty years the standard small closet of the world. Especially designed for limited space. Used in owners, also in crews quarters for heavy duty. Space occupied 17" x 19".

Weight: Net, 42 lbs. Shipping, 82 lbs.

"Sands" Composition Sea Cocks and thru' hull connections

PLATE S-127
The "Granby" Round Way Sea Cock. For large closets.

1 inch.....	$4.00
1¼ inch.....	5.50
1½ inch.....	7.00
2 inch.....	11.00

Sizes 2½" and 3" also made.

PLATE S-126
The "Glenora" Composition flat way sea cock.

	Price
¾ inch.....	$2.25
1 inch.....	3.00
1½ inch.....	5.25
2 inch.....	8.00

Sizes 2½" and 3" also made.

PLATE S-130
The "Alton" Brass Inlet Connection. Iron Pipe:

¼ inch.....	$1.00
⅜ inch.....	2.25
½ inch.....	1.50
⅝ inch.....	1.75
¾ inch.....	2.25
1 inch.....	3.75
1½ inch.....	

PLATE S-131
The "Carlton" Brass Outlet Connection. Iron Pipe.

¾"	1"
$1.50	$1.75
1¼"	1½"
$3.00	$3.75

2"
$2.50
2"
$5.25

PLATE S-2062
The "Angle" Composition flanged Sea Valves, with straight couplings, for use on the supply and discharge of small pump closets.
Price per pair with strainer for supply..... $6.00

PLATE S-128
The "Haiona" Composition Outboard Connection with flap valve and coupling used on discharge of closets, lavatories, sinks or on exhaust of engines.

PIPE	I. P.			
¾	1	1¼	1½	2
$2.00	$2.75	$3.75	$5.00	$7.00
	I. P.			
¾	1	1¼	1½	2
$2.00	$2.50	$3.50	$4.50	$6.50

PLATE S-121
Straight Pattern

The "Keno" Automatic Back Water Swing Check Valve, made of iron, galvanized, or composition, both straight and elbow patterns. Made in one size only 4" inlet and 4½" outlet, both ends flanged and fitted with cleanout plug. Used on waste lines of closets and other fixtures to prevent water splashing into fixture when vessel is in a sea way. Prices and full information on request.

PLATE S-122
Elbow Pattern

A Single Valve closet suitable for use with pressure from sanitary pump

COMMERCIAL S-2070. (Copyrighted.)

The "COMMERCIAL" Closet is specially designed for use above the water line only. If it is placed near the water line we would suggest the use of our "Keno" automatic back check valve. This closet is strong, well made, and designed for heavy duty. Consists of vitro-adamant flushing rim oval bowl, galvanized iron valve box, mounted on galvanized iron base plate. Composition quick opening supply flush valve with coupling for I. P. connection to pressure system. Galvanized malleable iron operating lever with composition axle and valve.

Heavy oak seat and cover with heavy cast brass post hinges, metal parts painted white, N. P. trimmings.... $54.00
Metal parts painted white, N. P. trimmings, oak seat without cover 52.50

Net weight, 115 lbs. Approximate shipping weight, 160 lbs. Space occupied, 21" x 17".

THE "WINNER" PLATE S-2061. (Copyrighted.)

The "WINNER" Pump Water Closet for use above or below the water line. Vitro-Adamant flushing rim hopper bowl. Oak Seat with nickel plated brass post hinges. 2½ inch Combination Supply and Discharge Pump. "Sands-Special" quick opening supply Valve and "Sands" patent back water check valve. Brass handle and gearings.

Plate S-2060 The "WINNER" Closet as described with oak seat $24.00
Plate S-2061 The "WINNER" Closet as specified above with oak seat and cover 25.00

We make a complete line of closets, lavatories, showers, heaters, bath tubs, sinks and galley pumps. Information upon request.

A. B. SANDS & SON COMPANY

Largest Manufacturers in the World

MARINE PLUMBING SPECIALTIES
1849—"SIXTY-EIGHT YEARS OF QUALITY"—1917

22-24 Vesey St., New York, U. S. A.

THE RECOGNIZED STANDARD OF THE WORLD

AN ASSORTMENT OF CLOSETS, LAVATORIES, PUMPS AND SPECIALTIES OF THAT WILL APPEAL TO DISCRIMINATING OWNERS, BUILDERS AND HIGHEST QUALITY DESIGNERS.

On account of the abnormal high prices and scarcity of materials and labor, selling prices are advanced over list based upon cost. to meet conditions ranging from list prices as net up to 50% advance

"Marco"—Plate S-28

The "Marco" Improved Pump Water Closet. Vitro-Adamant oval pedestal bowl, oak seat and cover. Improved THREE (3) INCH combined supply and waste pump. Complete as shown.....$75.00
Mahogany seat and cover, add.. 2.00

"Huron"—Plate S-2035

(Patented—Copyrighted.)
The "Huron" Pump Water Closet has new style extra heavy Vitro-Adamant flushing rim hopper bowl, 5" combined supply and waste pump. Complete with Oak seat and cover. Pump rough, N. P. trimmings $120.50

"Iowa"—Plate S-2040

(Patented—Copyrighted.)
The "Iowa" Pump Water Closet. Vitro-Adamant extra heavy oval hopper bowl, 4" supply and waste pump. Price with oak seat and cover, pump rough with polished trimmings $85.00

"Florida"—Plate S-2015

(Patented—Copyrighted.)
The "Florida" Pump Water Closet with extra heavy oval Pedestal Vitro-Adamant Bowl, 4" combined supply and waste pump with check valve in waste arm. Complete with oak seat and cover pump rough with finished trimmings..... $100.00

"Mohawk Improved"—Plate S-2030

(Patented—Copyrighted.)
The "Mohawk Improved" Pump Water Closet, extra heavy Vitro-Adamant oval flushing rim hopper bowl. Composition supply and waste pump, 3" cylinder. Pump rough with polished trimmings, oak seat and cover $70.00

Plate S-151

The "Roslyn" Folding Lavatory, with tumbler rack; N. P. copper lining; N. P. Copper combined round basin and slab; N. P. copper soap and brush holders; N. P. brass double-acting pump with combination brass swing supply faucet.

Made in Two Sizes	No. 1	No. 2
Quartered oak, pol. finish	$37.50	$42.50
Mahogany, polished finish	30.00	44.50
Height	19½"	22"
Width	15"	22"
Depth, open	18½"	18"
Diameter of basin	10"	12"

Plate S-153 fitted with faucet instead of pump.

Plate S-160

The "Hampton" Vitro-Adamant Lavatory oval basin, N. P. Brass waste fittings, Vitro-Adamant Reservoir and Waste Receiver, N. P. brass lock waste valve with key..... $24.00
Dimensions: Slab 18½" x 16½", back 5", basin 14" x 11".

"Bow" Closet—Plate S-2050

(Design Patent Applied For.)
The "Bow" Closet, Vitro-Adamant Bowl, 2½-in. pump, located at rear, fitted with swing handle. Quick opening supply valve. Space occupied, 15 x 24 in.
Pump rough, with finished trimmings, oak seat, N. P. Hinges $30.00
Dimensions: Front to back 23 in., width 14 in., height 12 inches.
Net weight, 35 lbs. Shipping, 70 lbs.

Plate S-3077

The "Jefferson" stateroom lavatory, Vitro-Adamant reservoir with N. P. brass self-closing supply faucet, Vitro-Adamant basin with waste receiver and brass waste cock. Price.....$25.50
Plain glassware and N. P. holders extra $5.00

Plate S-150

The "Glenwood" Folding Lavatory, with Vitro-Adamant oval basin, N. P. copper lining, N. P. brass double-acting pump, N. P. brass trimmings.
Quartered oak, polished finish.. $42.50
Mahogany, polished finish..... $44.00

Plate S-152

"Croton" Folding Lavatory, same as Plate S-150, except with faucet for pressure or gravity supply.
Quartered oak, polished finish.. $37.50
Mahogany, polished finish..... $39.00

Plate S-3381

Small Vitro-Adamant Corner Lavatory only 2" on side, with Nickel-Plated Plug, Stopper Chain and Stay, Nickel-Plated Faucet, Trap, Standing Soap Dish, N. P. 707 Supply Pump. Complete as described.
$28.00

Plate S-3183

The "Manatee 14" Vitro-Adamant, Flat Back Lavatory, with N. P. Basin Pump and waste fittings; no trap.....$22.75

Plate S-3190

The "Mono 12" Vitro-Adamant Corner Lavatory with N. P. Brass Pump and waste fittings and N. P. Full "S" Trap... $25.50

Plate S-771

Brass Gasoline and Oil Pump with special valves.

Dia.	Lg.	
1⅛	13	$5.00
1½	18	7.00
2"	24	13.00

Plate S-3196

The "Manco" Lavatory: same as Plate S-3190, except with faucet instead of pump and without trap..... $10.75

Plate S-3180

The "Monard" Lavatory, same as Plate S-3183, except with faucet, instead of pump and with N. P. Full "S" Trap.....$13.25

Plate S-3186

The "Modeo" 12" round front Vitro-Adamant Lavatory, with N. P. Compression faucet, waste fittings and full "S" trap $12.75

Plate S-750-A

New Style Double-Acting Brass Bilge Pump, with foot attachment and 5-ft. discharge and suction hose with brass strainer.
No. 1—1½" diam., 15" long $5.00
No. 2—1½" diam., 15" long $6.50
No. 3—2" diam., 24" long $14.00

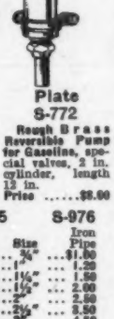


Plate S-772

Rough Brass Reversible Pump for Gasoline, special valves, 2 in. cylinder, length 12 in.
Price $8.00

Plate 1303¾-B

Cast Bronze Round Raised Strainer.

2½"	$0.35
3"	.50
4"	.65
5"	1.00
6"	1.50
7"	2.25
8"	3.00

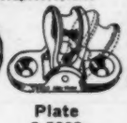


Plate S-5202

Universal Polished Brass Rope Lead.

¼"	$0.25
⅜"	.50
½"	.75

Plate S-719

Brass Galley Pump, mounted on iron frame, polished faucet, handle reversible, outlet adjustable.
2" $9.00
2½" 13.50
For additional side outlet, add 1.00

Plate S-709

All Brass Galley Pump, 1½ in. Cylinder, reversible handle with shut-off cock.
Polished $8.50
N. P. all over..10.50

S-975 / S-976

Lead Pipe Size	Lead Pipe	Iron Pipe
¾"	$0.60	$1.00
1"	.70	1.20
1½"	.80	1.50
1½"	.90	2.00
2"	1.20	2.50
2½"	1.60	3.50
3"	2.20	4.50

POLISHED BRASS DECK PLATES, HEAVY WEIGHT GUARANTEED

Plate S-5210

"Sands" Polished Bronze Fender Hooks, with screws for ¼ in. rope. Price per doz. $2.50

Plate S-132½

Cast Bronze Combination Inlet Connection with Strainer and Scoop.

	I. P.	L. P.
¼"	$2.25	$2.65
⅜"	2.50	2.90
½"	3.00	3.40
¾"	3.75	4.25
1"	4.50	5.00

Plate S-774

Rough Brass Reversible Pump, for Oil and Gasoline, fitted with special valves. 2" Cylinder, Length 12"
Price $8.00

Plate S-780

Double Acting Brass Auto Bilge Pump, 15 inches long under spout and fitted with 5 feet of rubber hose.
No. 1—1½" diam..$3.00
No. 2—1½" diam.. 4.50
No. 3—1½" diam.. 24" long, with foot rest, $5.50

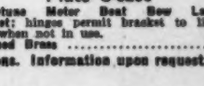


Plate S-5200

Neptune Motor Boat Bow Lantern Bracket; hinges permit bracket to lie on deck when not in use.
Polished Brass $0.75

We make a full line of ventilators, gasoline and bilge pumps, horns, whistles, strainers, portlights, deck plates and specialties and outboard connections. Information upon request.

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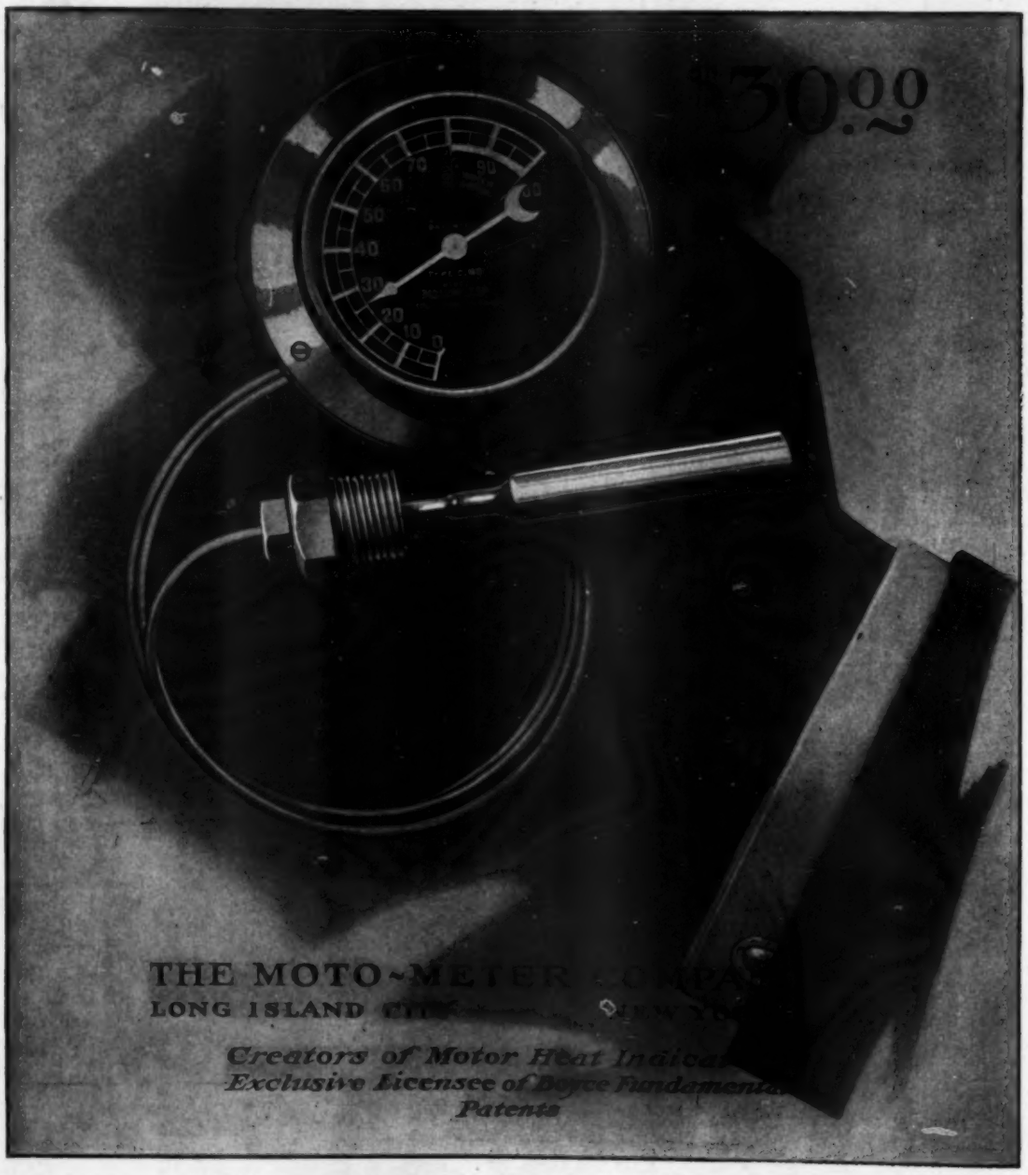

"The writer recently conducted a series of tests upon a small stationary machine in the laboratories of the Rhode Island State College—by running the jackets at 212 Fahrenheit instead of 63 Fahrenheit, over 66% more work was obtained with exactly the same amount of gasoline."—R. L. Wales, Professor of Mechanical Engineering, Rhode Island State College.

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DEFOE Knock-Down frames are set up complete at the factory before they are knocked down for shipment. Every part is fastened with screws and bolts, and we put on the top strake of planking and bore holes.

There is only one way to put it together, and that is the right way. Any man who can drive a nail straight and read plain English, can build a good sound boat by the Defoe system.

Save Half to Three Quarters on Your New Boat

Don't pay war prices for your new boat. And don't give up your plans for next summer's sport just because one man on the other side of the world is going to get what's coming to him.

You can get just as big a boat as you want for less than half what you expected to pay. Or if you have appropriated a certain amount, you can have twice as big a boat as you could have bought already built.

DEFOE K.D. BOATS

The Defoe plan is the logical solution of the problem of making your pocket-book meet your taste under present conditions. Every dollar you spend returns 100 cents worth of actual boat value. You get a boat that is the finest in design, appearance, material, strength and seaworthiness.

The Defoe line includes boats of every popular size and type, from a 9 foot tender to a 65 foot deep sea cruiser or commercial boat. You can buy the patterns, knocked down frame or partly finished hull, to be finished up by yourself or your local boat builder.

We also build finished boats of the highest quality in every detail. Our big K.D. business and standardized designs cut our cost on the finished boats, while our finished boat business guarantees that Defoe K.D. frames are thoroughly practical in design and construction.

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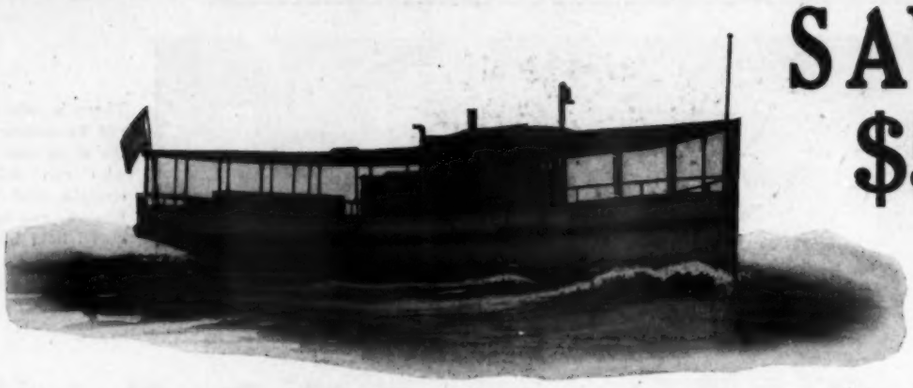

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GALUSHA GAS PRODUCER

Chicago, Ill., Sept. 29, 1917.

MR. H. JACOBSEN,
25 No. Dearborn St., Rm. 207,
Chicago, Ill.

Dear Sir:

I have a 50 H.P. Galusha Gas Producer in connection with a 60 H.P. engine installed in my passenger boat the "Chicago," plying between Lincoln Park, the Municipal Pier and Grand Park.

Here is a brief report or data of the operation during this Summer:

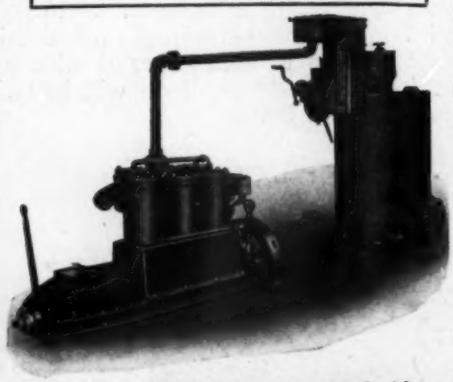
I have run my boat every day (a few rainy days excepted) from about 9 A. M. to 11 P. M. without losing one minute, and I run the engine "dead slow" at the docks without any danger of stalling. This shows absolute reliability.

The consumption of pea coals has amounted to not over 1½ tons of coal a week, or a cost per day of less than $2.00, a saving in cost of fuel of some $540 per month. This is real economy.

I have run my boat all day in storms and heavy seas, when all the "double deckers" had to tie up at their docks, and this weather did not interfere with the operation of the producer at all.

To prove my satisfaction, I will add that I shall most certainly install this kind and make of power in my next boat.

Very truly,
(Signed) FRED WEIMER.



A Galusha Gas Producer connected with a marine motor

ONE-TENTH the fuel cost of gasoline.

ONE-FOURTH the fuel consumption of a steam engine.

LOWER FIRST COST and FUEL COST than Diesel and other oil engines.

Read this letter from the owner of a Galusha-equipt boat. We can show you many other letters of the same kind, many of them stating the actual saving they have been able to make since the Galusha Gas Producer was installed.

The Galusha Producer in connection with a good marine engine provides the most economical marine power known. It is cheaper than gasoline, kerosene, crude oil, fuel oil, steam, or natural gas. It has the advantages of all with the disadvantages of none. Requires less floor space than other producers. Easy to operate—simple to care for.

In commercial use all over the world for the past ten years in power plants of from 50 to 500 horsepower.

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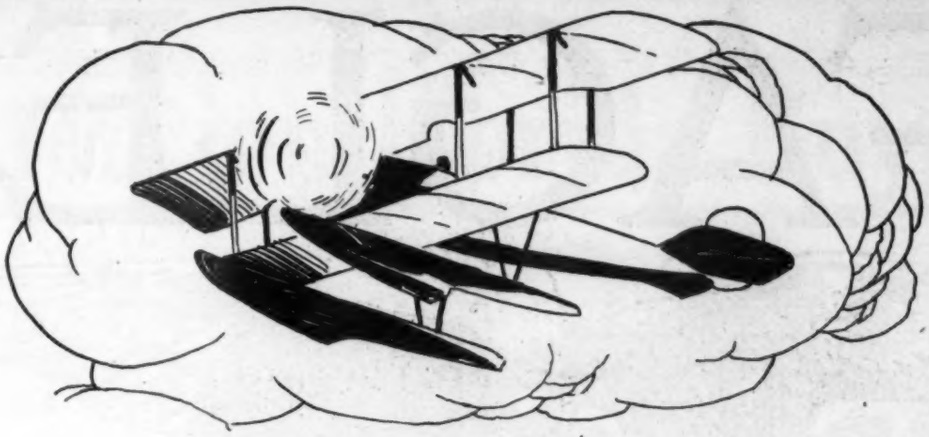

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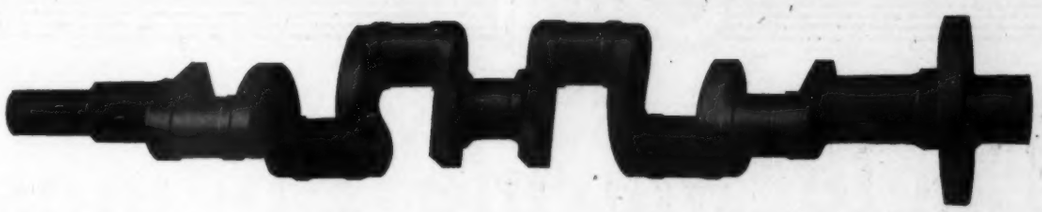


GUARANTEED FORGINGS

Just as the performance of a boat depends on the reliability of its engine, so does the performance of an engine depend upon the reliability of the various parts which enter into its construction.

Wyman-Gordon Guaranteed Forgings are contributing their full share to the reliability of many of the finest motors made in this country for automobile, marine and airplane use.

Our two great plants, specializing on forgings exclusively, are responsible for the constant quality and splendid service upon which the Wyman-Gordon reputation is built.

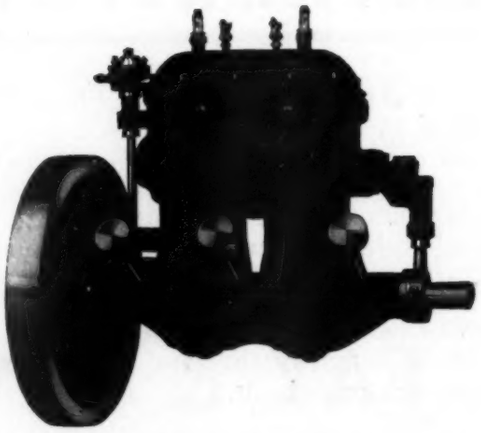
Engine builders will find it advantageous in many ways to let our organization take the place of a forging department in their own plant. Let us submit quotations.

WYMAN-GORDON COMPANY

WORCESTER, MASS. **CLEVELAND, OHIO**

EAGLE Engines

Eagle Marine Engines



This company has specialized for 18 years on two cycle Marine Engines for pleasure and working boats. The product during these years has progressed with the demands and today Eagle Engines are as near perfection as experience and modern manufacturing equipment can make them.

Our line covers every requirement for Boats up to 25 feet in length of the pleasure and working models, and in our offering you can find an engine that will meet your exact requirements.

As "Eagle" Engines are sold through established dealers throughout the world, the service possible under these conditions is of considerable importance to the user. It's not too early to arrange for 1918 agencies at this time. We are always pleased to give applications our prompt consideration.

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THE TORRINGTON COMPANY

STANDARD PLANT : TORRINGTON, CONN.

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We illustrate below, two snappy runabout designs, ideal for use in Southern Waters

26' x 5' Runabout
Speed 18 miles
35 H.P. 4 cylinder, 4 cycle engine

32' x 5' 6" Runabout
Speed 20 miles
45 H.P. 4 cylinder, 4 cycle engine

Speedy and comfortable, handsomely finished in mahogany, with electric starter and lights, and salt water equipment, The power plant in each is our own

DEPENDABLE

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"NONE BETTER BUILT"

We also have other sizes and designs AVAILABLE FOR EARLY SHIPMENT. Literature giving full details will be mailed promptly on request.

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MOTOR BOATING ADVERTISING INDEX

A

Aerothrust Engine Co. 97
Albany Boat Corp. 120
Alden, John G. 70
Anderson Engine Co. 70
Arrow Motor & Machine Co. 76
Automatic Bilge Bailer Co. 70
Automatic Machine Co., The 124, 125

B

Baldridge Gear Co. 70
Bantam Ball Bearing Co. 70
Belle Isle Boat & Engine Co. 70
Betsy Ross Flag Co. 70
Billings-Chapin Co. 76
Boston Varnish Co. 109
Bowes, T. D. 70
Brooklyn Varnish Co. 70
Brooks Mfg. Co. 76
Bruns Kimball & Co., Inc. 70, 98
Bryant & Berry Propeller Co. 85
Buffalo Gasolene Motor Co. 1
Buffalo Specialty Co. 70
Burger Boat Co. 76
Byrne Kingston & Co. 95

C

Caille Perfection Motor Co. 4
Calman Co., Emil 70
Campbell Co., A. S. 76
Cape Cod Power Dory Co. 92
Carleton Co., The 74
Carlisle & Finch Co. 76
Carlyle Johnson Machine Co., The 2
Carpenter & Co., Geo. B. 86, 96
Central Mfg. Co. 80
Champion Spark Plug Co. 126
Chase Co., L. C. 70
Classified Advertisements 68, 69
Clemente, Perez & Hijo 70
Columbian Bronze Corp. 123
Columbus Mfg. & Supply Co. 70
Connecticut Telephone & Electric Co. 74
Cox & Stevens 62, 70
Crockett Co., The David B. 80
Cullen Motor Co. 74
Curtiss Aeroplane Co., The 74
Curtiss Co., J. H. 90
Cutting & Washington Co. 74

D

Dachel Carter Boat Co. 96
Deering Boat Mfg. Co. 76
Defoe Boat & Motor Works 131
Detroit Lubricator Co. 89
Devoe, F. W. & C. T. Raynolds Co. 112
Domestic Engineering Co. 76
Draeger Oxygen Co. 74
Driggs Ordnance Corp. 86
Duesenberg Motor Corp. 3
Du Pont Fabrikoid Co. 89
Durkee & Co., Inc., C. D. 117
Dusenbury, L. & Co. 88

E

Egyptian Deities 73
Elbridge Engine Co. 74
Elco Co. 2nd Cover, 71
Ericsson Mfg. Co. 109
Evinrude Motor Co. 76
Excelsior Propeller Co. 85

F

Fay & Bowen Engine Co. 135
Ferdinand & Co., L. W. 108
Ferro Machine & Foundry Co. 74
Flying 106
Frisbie Motor Co., Inc. 121
Fyr-Fyter Co. 110

G

Gardner & Co., Wm. 66
Gas Engine & Power Co., and Chas. L. Seabury Co., Consolidated 108
Gene V-Boat Co. 92
Gielow & Orr 65
Gies Gear Co. 74
Gill & Sons, P. H. 88
Gray Motor Co. 113
Gray & Prior Machine Co. 127
Great Lakes Boat Bldg. Corp. 6
Gulf Refining Co. 114

H

Hacker, J. L. 99
Hall Co., W. S. 80
Hall, Wilford, Laboratories 80
Hand, Jr., Wm. H. 70
Harris Engine Co. 94
Heinze Electric Co. 86
Henricks Magneto & Elec. Co. 86
Hvid Co. 93
Hyde Boat & Eng. Co. 80
Hyde Windlass Co. 118

I

International Life Suit Corp. 111

J

Janney, Steinmetz Co. 93
Jennings Co., H. H. 67
Johns-Manville Co., H. W. 80
Jones, S. M. Co., The 76
Joymotor Mfg. Co. 80

K

Kahlenberg Bros. Co. 89
Kemp Machine Works 80
Kennedy Machine Co. 91
Kermath Mfg Co. 76
Keystone Varnish Mfg. Co. 80
Knock Down Motors Corp. 75
Koban Mfg. Co. 80
Kroh Mfg. Co., C. Z. 80

L

Lacy Marine Motor Co. 80
Langtry Machine & Tool Co. 105
Lawley, Geo. & Sons Corp. 79
Lawrence & Co., L. 80
Leece Neville Co. 76
Life Preserver Suit Co. 86
Lipman Mfg. Co. 80
List Mfg Co., E. J. 80
Lobee Pump & Machine Co. 86
Lockwood-Ash Motor Co. 116
Lord, Frederick K. 70
Ludera Marine Construction Co. 90
Lunkenheimer Co., The 93

M

McFarlan & Spilker Mfg. Co. 85
McQuay-Norris Mfg. Co. 107
Manzel Bros. Co. 93
Marine Compass Co. 80
Marine Equipment & Supply Co. 86
Marvel Carburetor Co. 97
Masten Co., G. H. 80
Masters, Irwin W. 80
Mathis Yacht Building Co. 73
Matthews Co. 100
Meisel Press Mfg. Co. 80
Michigan Wheel Co. 85
Miller Eng. Co. 115
Mills, R. S. 80
Missouri Engine Co. 89
Moto-Meter Co. 130
Motor Specialties Co. 80
Mullins Co., W. H. 78
Munn & Co. 94
Murphy Varnish Co. 78
Murray & Tregurtha Co. 88
Muskegon Motor Specialties Co. 76

N

Nat'l Assn. Eng. & Boat Mfrs. 88
Naval Architects & Yachts Brokers 70
Navy Gear Co. 107
Nelson Blower & Furnace Co. 132
New York Yacht, Launch & Engine Co. 90
Niagara Motor Boat Co. 106
Niagara Motors Corp. 88
Nock, Frederick S. 70, 92
Norma Co. of America, The 87

P

Packard Electric Co. 99
Paragon Gear Works 81, 82, 83, 84, 137
Para Rubber Products Co. 78
Peerless Marine Motor Co. 78
Pneumercator Co., Inc. 78
Pull-U-Out Sales Co. 78
Pyrene Mfg. Co. 78

Q

Quayle Motors Co. 87

R

Racine Boat Co. (Racine) 87
Red Wing Motor Co. 100
Regal Gasoline Engine Co. 74
Renaud Boat Wks. 88
Richardson Boat Co. 88
Roberts Motor Mfg. Co., The 85

S

S. K. F. Ball Bearing Co. 78
S-R Mfg. Co. 78
Sands & Sons Co., A. B. 128, 129
Sanford, Harry W. 70
Scripps Motor Co. 138
Seaman, Stanley M. 63
Sears Roebuck Co. 78
Sherman, E. M. 78
Smalley General Co. 78
Smith & Co., Edw. 78
Smith Serrell Co., Inc. 87
Snow & Petrelli Mfg. Co. 122
Standard Aero Corp. 78
Standard Motor Construction Co. 2nd Cover, 77
Standard Oil Co. 78
Standard Oil Engine Co. 78
Stanley Co., The 78
Stearns-McKay Co. 86
Sterling Engine Co. 3rd Cover, 101, 102, 103, 104

T

Tams, Lemoine & Crane 64
Texas Co. 78
Thompson Bros. Boat Mfg. Co. 78
Tiebout Co., W. & J. 95
Toppan Boat Mfg. Co. 85
Torrington Co. 134
Trimount Rotary Power Co. 69

U

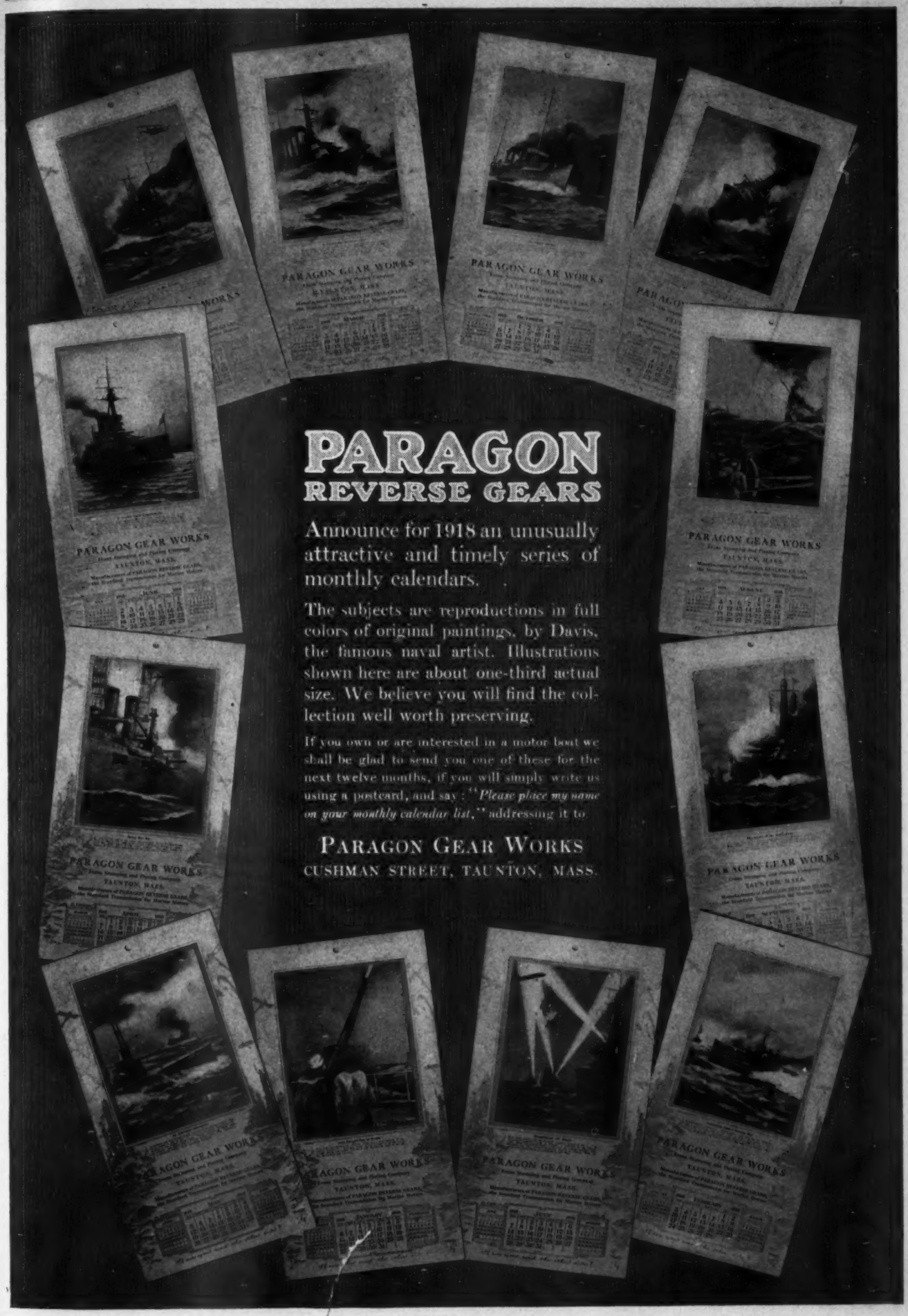
United States Vaporizer Co. 91
Universal Motor Boat Supply Co. 76
Universal Motor Co. 92

V

Valentine & Co. 61
Valley Boat Co. 105
Van Blerck Motor Co. 4th Cover
Viper Co., Ltd. 119

W

Wakefield Brass Co. 85
Water Craft Co. 78
Watkins Motor Co., The 78
Watts, J. M. 70
Weston Electric Inst. Co. 88
Wicker-Kraft Co. 90
Wilcox, Crittenden & Co., Inc. 85, 91
Wilmarth & Morman Co. 76
Winton Engine Works 76
Wisconsin Motor Mfg. Co. 91
Wright Machine Co. 98
Wycombe Co., Inc. 76
Wyman & Gordon Co. 133


PARAGON
REVERSE GEARS
Announce for 1918 an unusually attractive and timely series of monthly calendars.
The subjects are reproductions in full colors of original paintings, by Davis, the famous naval artist. Illustrations shown here are about one-third actual size. We believe you will find the collection well worth preserving.
If you own or are interested in a motor boat we shall be glad to send you one of these for the next twelve months, if you will simply write us using a postcard, and say: "Please place my name on your monthly calendar list," addressing it to
PARAGON GEAR WORKS
CUSHMAN STREET, TAUNTON, MASS.
PARAGON GEAR WORKS
TAUNTON, MASS.

Scripps

"Regina," 36′ x 10′ x 2′, built by the Valley Boat Co. for Mr. E. H. Lyon, Englewood, N. J. Designed by Wm. J. Deed, N. A., Boston. Series "B" Scripps Motor

Valley Cruisers

During the past season the Valley Boat Company of Saginaw, Michigan, has concentrated largely on cruiser work of a high order, in two sizes—a 36x10′ and a 45x10′6″. Both of these models are from the board of William J. Deed, naval architect of Boston, whose excellent cruiser designs need no introduction.

Above is shown the "Regina," a bridge deck cruiser, 36′ x 10′ x 2′, recently constructed for Mr. E. H. Lyon, of Englewood, N. J., who will cruise in New York waters during the summer months, and from Miami during the winter season.

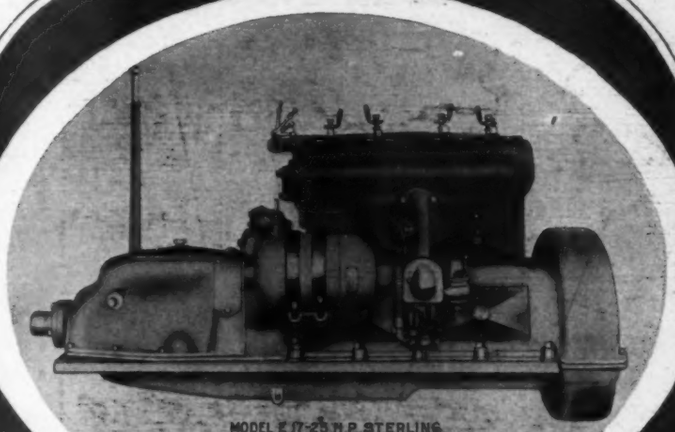
The "Regina" is marked for commodious appointments, seaworthiness, and ease of handling in rough water.

All controls are centered at the bridge deck, under which is installed a Series "B," four-cylinder, medium duty, all-enclosed Scripps motor, with electric starting and lighting outfit. This engine equipment insures cleanness and quietness of operation, certainty of service, and the most modern engine conveniences so necessary in the up-to-date cruiser.

Scripps engineers will gladly co-operate with you in powering your boat, whether for cruiser, runabout or commercial service. Make your problem our problem when writing for catalog.

SCRIPPS MOTOR CO. 631 Lincoln Ave. Detroit, Mich.

Sterling
THE ENGINE of REFINEMENT
For the finest boats that float



MODEL E 17-25 H.P. STERLING
WITH ELECTRIC STARTER AND GENERATOR

17 h.p. at 600 R.P.M.
25 h.p. at 1000 R.P.M.
30 h.p. at 1200 R.P.M.

Bore 3¾ inches
Stroke 5½ inches
Weight, with regular equipment, 600 lbs.

Enclosed Runabout and Small Cruiser Engine

In this new four-cylinder Sterling, there is refinement in every detail. All moving parts, including the flywheel, are enclosed. It is powerful and smooth and its clean finished appearance create an instant and forceful appeal. For runabouts and small cruisers this motor has won a deserved prestige. It is the ideal motor for the V-bottom runabout of today.

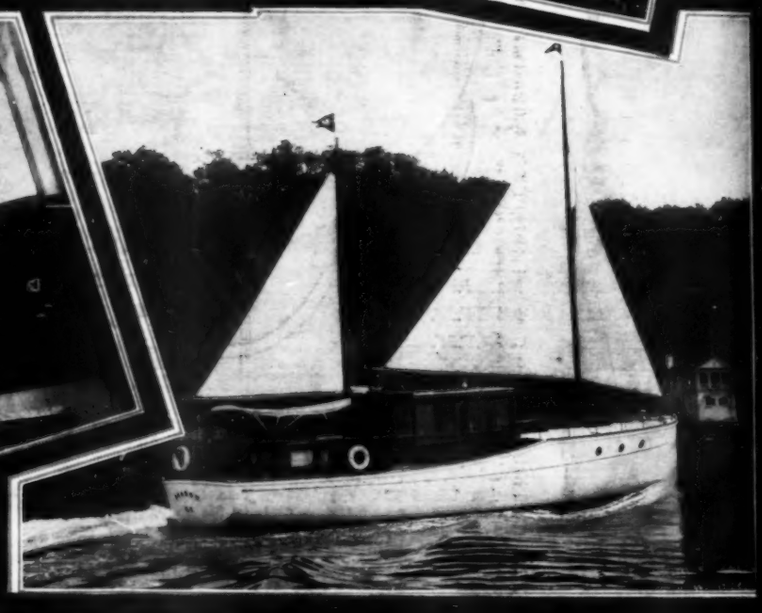
The 17-25 H.P. Sterling always has been popular and the improvement in the 1917 motor will make it even more so.

Price with regular equipment	$675.00
Price with rear starter and regular equipment . . .	700.00
Price with electric starter and regular equipment . .	825.00

Literature gladly mailed on request

STERLING ENGINE COMPANY
1254 Niagara Street Buffalo, N. Y.

Four cylinder Van Blerck motor installed in "Shadow III," owned by Dr. J. C. Ayer, Glen Cove, Long Island, N. Y.



WHEREVER you find boats you find Van Blerck Engines. The Van Blerck motor is the logical power plant for a boat that is to be complete in every detail,—that is to be comfortable, luxurious and modern. In fact, a boat that isn't powered with a Van Blerck engine places its owner almost in the position of having to apologize for his motor, if he takes any pride in his boat and makes any pretension of owning a modern, efficient boat.

VAN BLERCK MOTOR COMPANY 30 EAST 42nd STREET, NEW YORK CITY

VHS